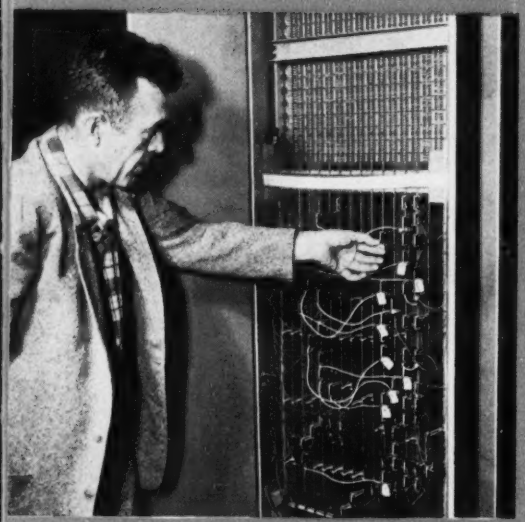
SEPTEMBER 1954

35 CENTS

FOOD ENGINEERING

A McGRAW-HILL PUBLICATION



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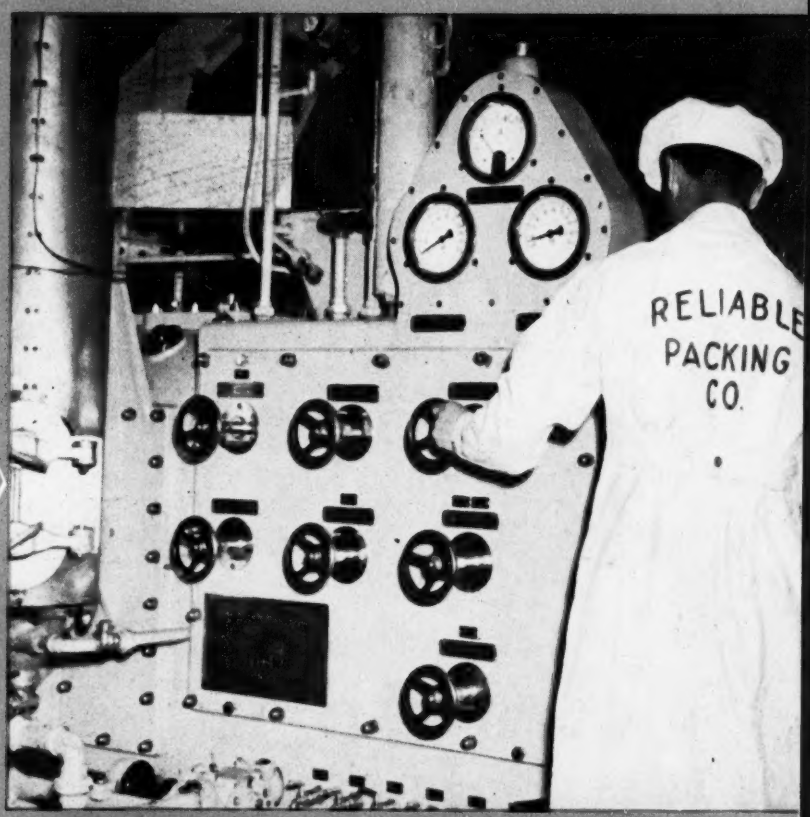
MEAT SPECIAL with **SHOW GUIDE**



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1

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September 1954

Volume 26 Number 9

FOOD ENGINEERING

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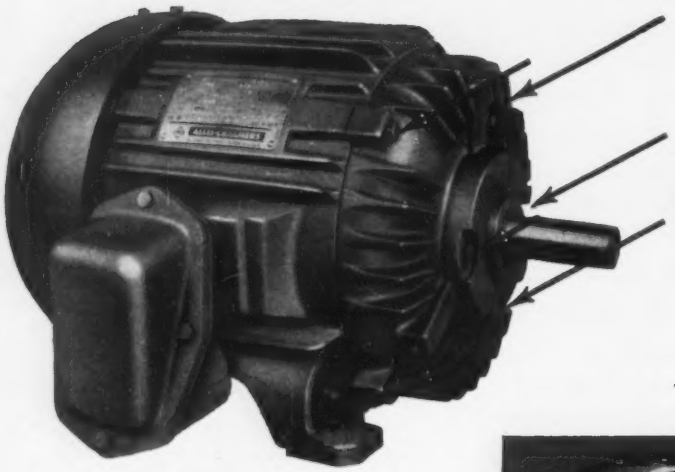
Here's motor superiority
you can see

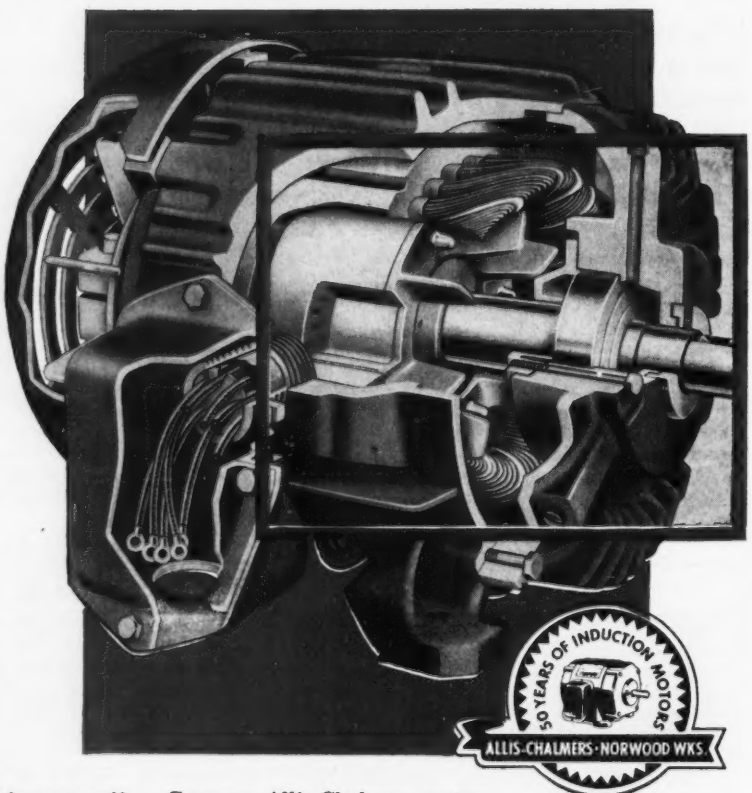


It takes 6 bolts not just 4 to give full bearing protection

THE TWO EXTRA BOLTS in the end housing of every Allis-Chalmers ball bearing motor are the proof of *extra* protection against bearing failure. These are the bolts that hold the bearing cap tightly in place against the inner face of the bearing enclosure. This cap, with its close running clearances, keeps grease from the interior of the motor . . . retains an ample supply within the bearing enclosure . . . protects the grease and the bearing against contamination from dirt and moisture.

At the outer side of the bearing, double labyrinth seals keep grease in, also keep dirt out. What's more, large grease reservoirs act as additional dirt traps.

Result? Allis-Chalmers motors pay off in longer, trouble-free bearing life, lower motor maintenance.



Get all the facts . . . judge for yourself — Compare Allis-Chalmers motors with other motors. Get the six-bolt construction that gives you complete bearing protection. For proof, see your Allis-Chalmers Office or Authorized Distributor, or write — Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

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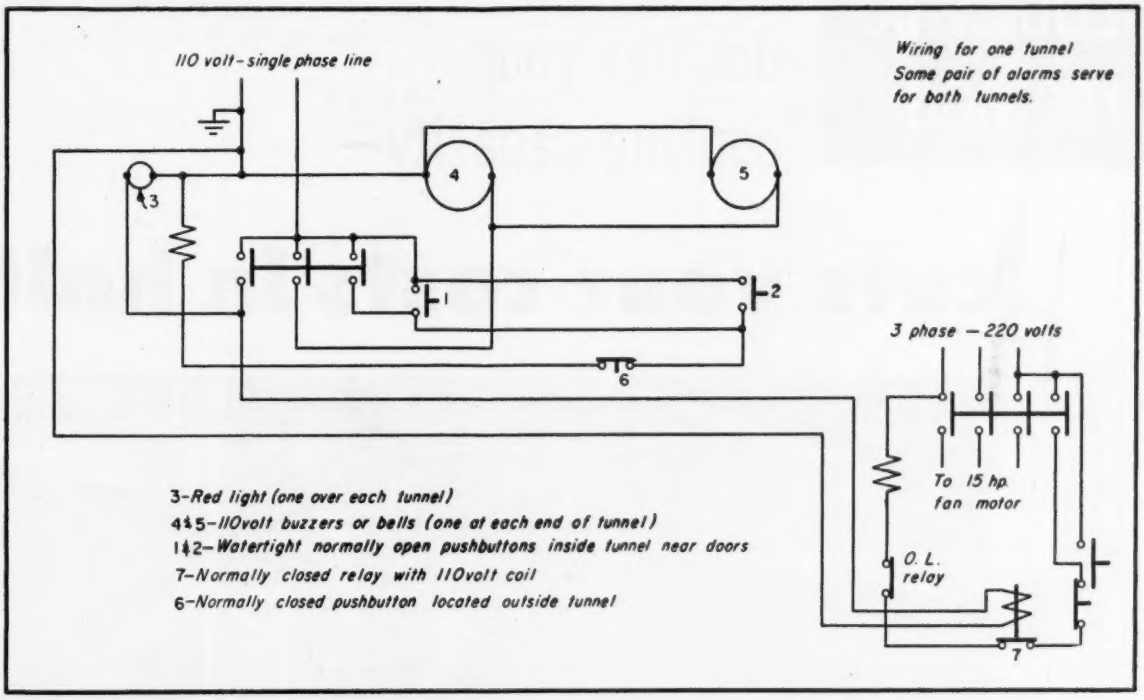
A-4441

PRACTICAL IDEAS


110 volt - single phase line
Wiring for one tunnel
Some pair of alarms serve for both tunnels.
3
4
5
1
2
6
3 phase — 220 volts
To 15 hp. fan motor
O. L. relay
7
3-Red light (one over each tunnel)
4 & 5-110volt buzzers or bells (one at each end of tunnel)
1 & 2-Watertight normally open pushbuttons inside tunnel near doors
7-Normally closed relay with 110volt coil
6-Normally closed pushbutton located outside tunnel

Freezer-Door Safety Control

The large fans drawing frigid air through the two quick-freeze tunnels in our plant create a powerful suction which tends to hold the heavy, tight-fitting refrigeration doors firmly shut. It is therefore very difficult for a man inside to push one open.

Should a worker find himself in this predicament, he need merely press one of the control buttons—(1 or 2) in sketch. The red lamp (3), which the control lights, will indicate to other plant personnel in which tunnel worker is confined.

Alarms (4 and 5), which call attention to the danger to the trapped man, are 110-v. buzzers or bells, one at each end of the tunnels. They will operate until someone on the outside presses normally closed pushbutton (6) located outside the tunnel. This control stops the 15 hp. fan motor so that, with the suction thus removed, the confined worker can usually open the door and escape the tunnel without further aid.

Since these tunnels are operated at a very low temperature, a worker trapped inside one for any length of time would be in extreme danger. However, the safety arrangement aids greatly toward eliminating this hazard. —*A. F. Cordley, Electrician, Bird's Eye Frosted Food Corp., Hillsboro, Ore.*

Message Inside Jar Cap

To get across a special message about its new "Fruit-of-the Vine" preserves, Welch Grape Juice Co. employs a simple, yet psychologically effective, device.

It prints the message on the underside of the closure —in black script on the gold finish of the metal.

Result: You notice the writing when you open the jar, are intrigued, and then you read this statement:

"You are about to enjoy an entirely new taste sensation —made from whole vine-ripened Concord grapes, with only the seeds removed.

"Try it on toast and hot biscuits—for omelettes or tarts —with waffles and pancakes—as a topping for a sundae!

"We would be especially grateful if you would write us of any unusual ways you serve it, and your thoughts about 'Fruit-of-the-Vine.'

"Many thanks.

"Home Economics Department, The Welch Grape Juice Co., Inc., Westfield, N. Y."

That's a lot of writing. But, then its a big cap—3½ in. in diameter. And the space adds considerable to the total labeling area of the container.

Besides, consumers are notorious for not reading labels on the outside of the container. So the surprise element of the inside message is an advantage.—*FE staff*

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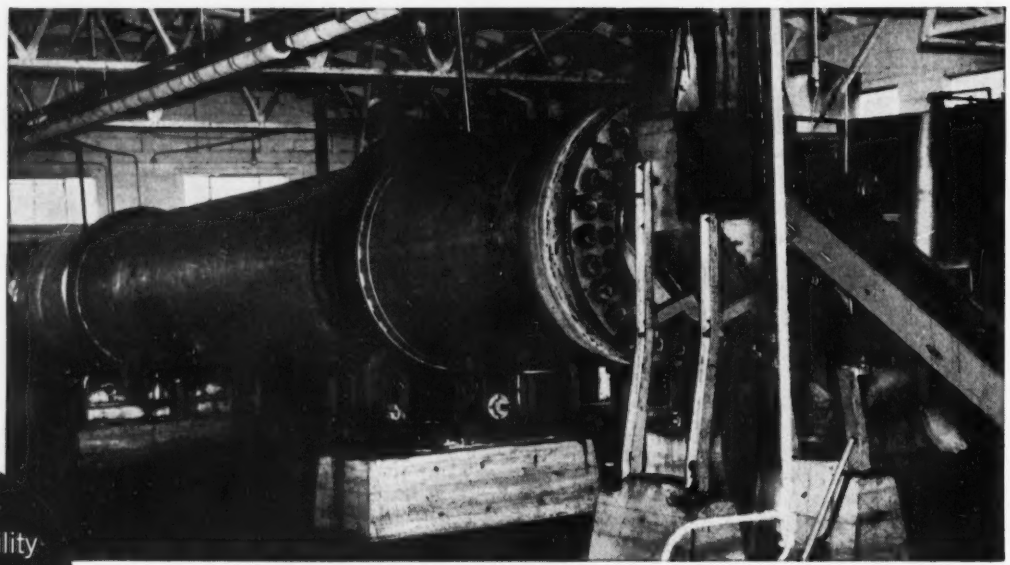
Louisville method doubles your cooking capacity—

cuts your costs in half



for dependability see General American

creative engineering design construction installation

A single Louisville Steam Tube Dryer has doubled the efficiency of this modern rendering plant*. It now discharges the offal from several "batch" cookers in less than half the normal cooking and drying time.

The Louisville method has also helped this plant reduce its unit cost and increase its efficiency in these ways:

- **Less total electricity required.**
- **Motor maintenance and replacement reduced.**
- **Less total steam required.**
- **Less maintenance and increased life for "batch cookers" by discharging the material before it becomes gluey and abrasive.**
- **Same labor handles additional capacity.**
- **Stack odors slight and easily controlled if necessary.**
- **Operates efficiently on all kinds of offal, blood, cracklings, steep water and manure.**

Let us send an engineer to help you make these savings, too.

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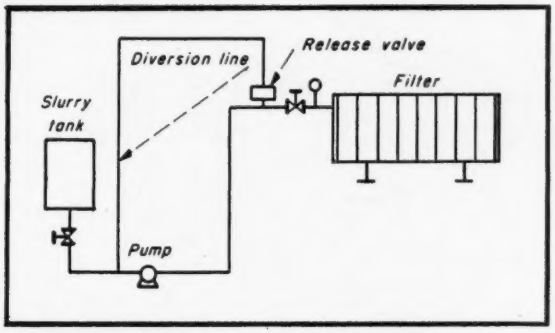


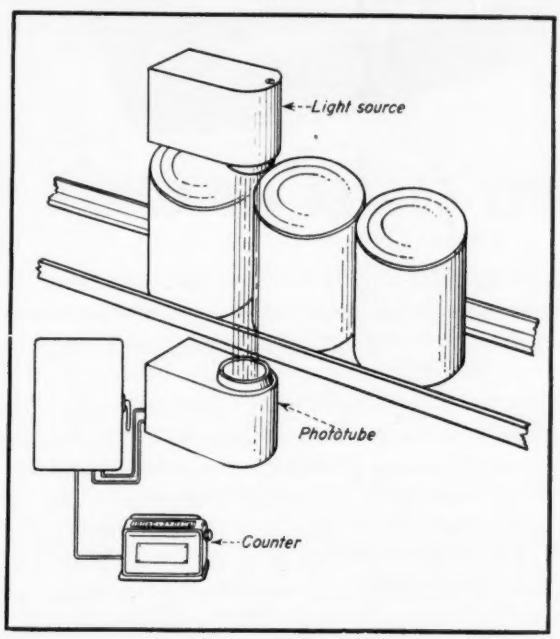
Safeguards Filter Operation

A flow diversion valve on the intake line of a filter press keeps operating pressure within safe limits. Thus, filter cloths last longer and strain on the press is reduced.

But of greater importance is puncturing of the filter cloths caused by excessive pressure. Time is then lost in replacing defective cloths and in refiltering cloudy batches.

The safety valve controlling pressure on the filter is a conventional release type which can be set to open at any desired pressure. As shown in the diagram, it is placed at a tee between the pump and the filter inlet. A branch of the tee returns to the pump suction line.

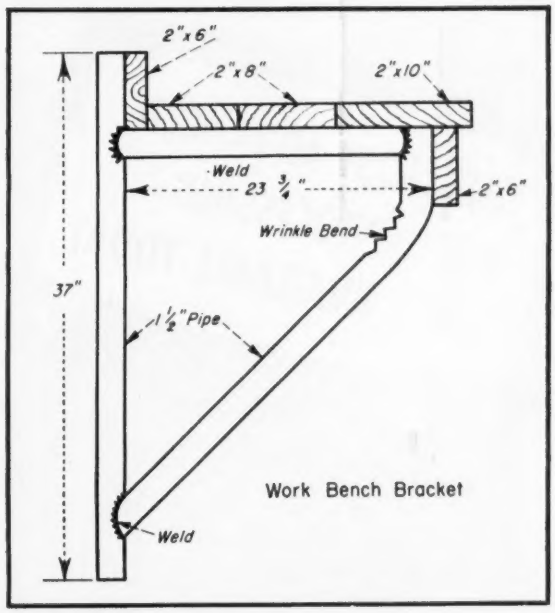
Now, with the valve set, when operating pressure approaches the danger point, the release opens and diverts the slurry back to the pump. With pressure on the filter relieved, the slurry continues to recirculate harmlessly until the cause of the pressure buildup is corrected.—*FE staff.*



Cans Counted by Electric Beam

High speed exact tabulating of the number of round containers moving on a conveyor can be obtained through use of photoelectric counting.

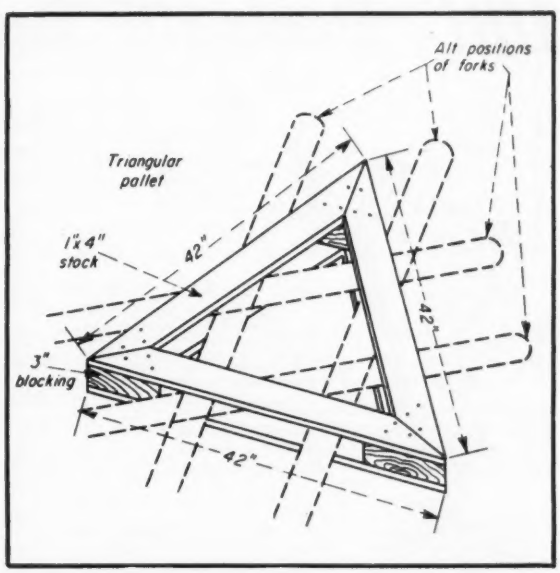
The correct location of the beam is important so that it is interrupted by the outer circumferences of the cans (see sketch), but restored by the passage of light through clearance between the circular containers.—*Photoswitch, Inc., Cambridge, Mass.*



Work Bench Bracket

You won't stub your toes on your work bench supports if you use the brackets shown here. These brackets are made from ordinary pipe, formed by wrinkle-bending to the necessary angle, and braze-welded.

Wrinkle-bending the pipe is easy. All you do is place one end of the pipe in a vise, heat a small area at the point to be bent, and apply pressure to the loose end. Bend the pipe slightly and repeat the procedure at an adjacent point so that a series of wrinkes is produced. Continue to heat and bend until you have the angle that you want.—*"Linde Tips," Linde Air Products Co., New York.*



New Type Pallet and Use

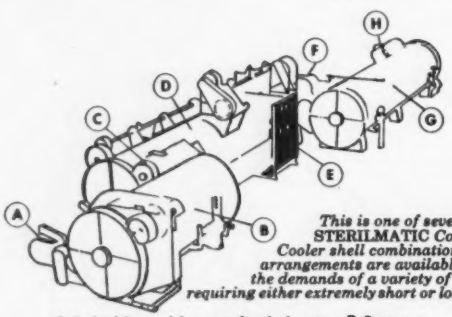
In the ham-curing section of our plant, we experienced a materials handling problem—now solved by redesigning the pallets.

As in most plants, it is our common practice to set

THE MOST ADVANCED FOOD PROCESSING LINES AVAILABLE TODAY
. . . Preserves the best in food flavor, color, texture and nutritive value

fmc "Sterilmatic" PRESSURE COOKER and COOLER

Trade Mark



This is one of several FMC STERILMATIC Cooker and Cooler shell combinations. Other arrangements are available to meet the demands of a variety of products requiring either extremely short or long cooks.

A Left side positive cup-feed elevator, **B** Pressure pre-heater, **C** Pre-heater discharge valve, **D** Pressure cooker, **E** Central control panel, **F** Micro-cool valve, **G** Atmospheric cooler, **H** Discharge turret.

High-speed *STERILMATIC* Cooker and Cooler lines give canners the *precise processing control* needed to maintain their high standard of product quality and uniformity. This continuous, automatic equipment cooks every can *evenly*—cooks every can *exactly alike*. The natural flavor, color, texture and essential vitamins of farm-fresh fruits and vegetables are protected and preserved at their peak of harvest perfection. And these qualities last, too—locked in to be fully enjoyed when the can is opened and the product served. Write for full information on FMC's outstanding "one-man cook room," or call your nearest FMC representative.

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Canning Machinery Division

General Sales Offices:

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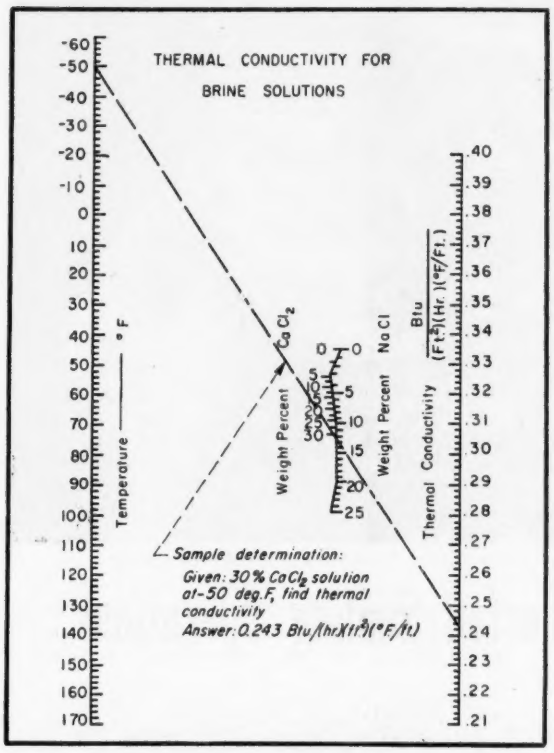
tierces of hams in cure on pallets so that they can be moved with fork trucks. In some of the older buildings columns are spaced on short centers, with the result that aisles are narrow. Fork trucks, therefore, have considerable difficulty maneuvering into position to pick up a pallet and its tierce of meats.

To overcome this difficulty we have resorted to triangular pallets that permit the fork truck to approach either at a right angle or a 45 deg. angle from either side.

Supports between upper and lower surfaces of pallets are in the three corners of the triangle.

Some areas otherwise unsuitable for fork truck and pallet operations can be converted to efficient materials handling with this pallet.—*Packing Plant Engineer.*



Handy Nomograph for Brine

Determining such physical properties as specific gravity, specific heat, and thermal conductivity of brine is essential for heat-transfer calculations.

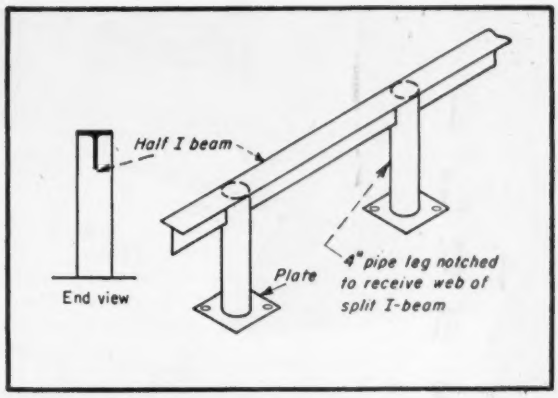
Though normally such properties (particularly over a wide temperature and concentration range) are scattered in the literature, the search for them is time-consuming.

The accompanying nomograph speeds thermal conductivity determinations. Temperature range is extensive (−60 to 170 F.), and the concentration covers the entire useful region.

Thermal conductivity for any desired temperature and concentration can be obtained readily by a single setting of a straight edge.

Here, for example, is how you determine the thermal conductivity of a 30% calcium chloride solution at −50 deg. F.:

Connect −50 on the temperature scale with 30% on the calcium chloride concentration scale and read the thermo-conductivity as 0.243 But./(hr) (ft.²) (°F./ft).—*Om. P. Kharbanda, Research Department, Simon-Carves, Ltd., Stockport, England.*



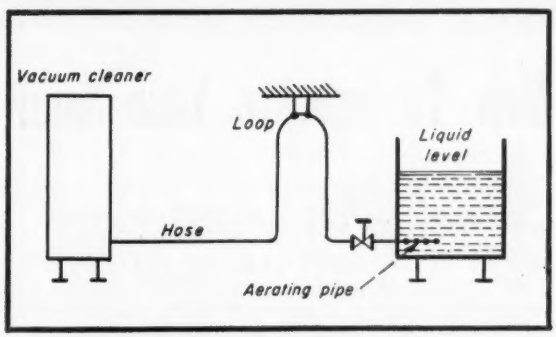
Sturdy Stand Easily Built

When we needed a heavy-duty stand to support machinery at a height of about 3 ft. from the floor, the only I-beams we had on hand were only about half the total length required. Also, they were 15 in. beams, and therefore much too heavy.

But, by splitting these beams lengthwise we obtained both the required length and the right weight.

Next, we fabricated legs, or supports, from heavy-duty 4-in. pipe. Into one end of each length of this pipe we cut a slot sufficiently deep to contain the web of an I-beam that had been cut in half. Then we lowered the web into the slots in a pair of the pipes and welded the beam in place.

For floor anchorage we welded a square metal plate to the bottom of each upright pipe. The plates, then, were lagged to the floor.—*William Morgan, Jr., Superintendent, Sugar Loaf Foods, Inc., Brookston, Ind.*



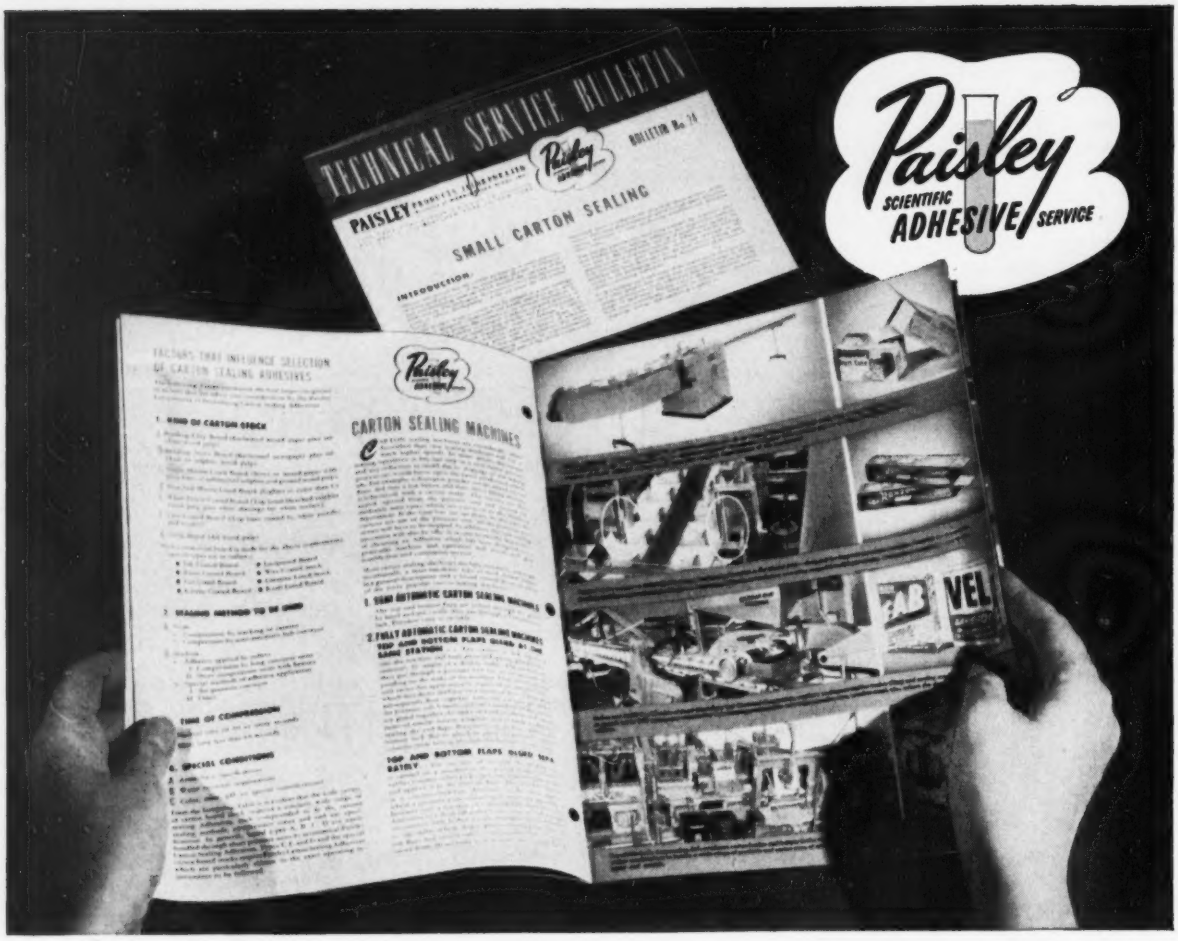
Loop in Hose Checks Back-Flow

Connecting the blower side of an industrial vaccum cleaner to a reaction tank by a length of flexible hose supplies air needed for a process, but can cause trouble when the machine is shut off. Normally, the operator first closes valve on air line entering tank, then stops blower.

But, if he forgets to close the valve in shutting off the machine, hydrostatic pressure in the tank forces liquid back to the vacuum cleaner and puts it out of order.

To insure against this happening, the flexible hose connection is suspended from the ceiling with a loop formed well above the level of the liquid in the tank. Now, even with the valve on the air line left open, liquid in the hose can rise only to its own level. And with the loop above this point, the liquid remains in the hose or can be blown back to the tank.

Although a check valve serves the same purpose, this arrangement is simpler and foolproof.—*FE staff.*



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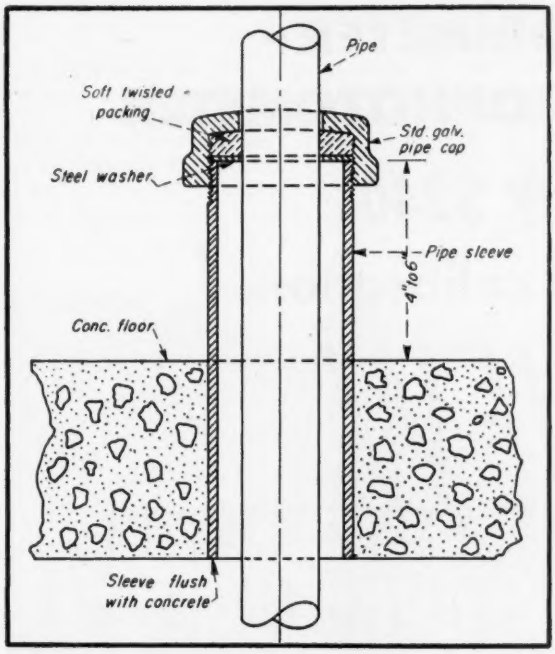

Seals Pipe Holes in Floor

Seepage of water around pipes that pass from floor to floor can readily and inexpensively be avoided in dairy, meat packing, beverage, and other plants where wash-down is frequently required.

The trick is to install water-tight sleeves around the pipes and conduits that pass through the floors. While these should be installed when the floors are poured, installations can be made at any time by cutting holes in the existing floor and cementing the sleeves in place with dry pack cement.

To prepare a suitable sleeve for pipes or conduits passing through floors, a length of galvanized pipe is cut long enough to set flush with the underside of the concrete floor and to extend at least 4 to 6 in. above the top of the floor. The top end of the pipe is full-threaded.

The section of the sleeve in the concrete should be nicked with chisel or pipe-vice jaws, so that it will not turn in the concrete. The sleeve should be at least two pipe sizes larger than the pipe line through the floor.

Now, to the threaded end of the sleeve, above the floor, a pipe cap is added. Into the cap has been drilled a hole with a diameter ⅛ in. larger than that of the pipe line. Any metal projections inside the cap are smoothed off.

Next a steel or wrought-iron washer is cut so that the outside diameter will clear the threads inside the cap, but left large enough so that the washer will rest on the top of the pipe sleeve.

The hole in this washer should also be ⅛ in. larger in diameter than that of the pipe line. After the line is in place, the space between pipe cap and washer is suitably packed, usually with soft twisted graphited type material, and the cap is screwed down to form a tight-packed joint.

These sleeve-protected passage ways through floors are suitable for electric conduit, steam, water, air and refrigeration lines. They not only prevent seepage of water from one floor to the other where pipes pass through, but also eliminate the possibility of condensation flowing down the pipes from the floor above.

For steam or refrigeration lines, the sleeves should be made large enough to allow a space of about 1 in. between the pipe and the sleeves for insulation.—*Chester J. Bell, Engineer, Portland, Ore.*

Novel Safety Stimulant

An unusual method of daily focusing attention on the accident record contributes measurably to accident prevention at Miller Brewing Co., Milwaukee.

Strategically located throughout the plant is a special type of safety bulletin board. On it are panels for replaceable numerals, which are changed each day to keep score on the number of days since the last accident.

Also on this board are two sets of lights. One set forms a green cross, the other is a single red light.

So long as the green cross is lighted, another day without accident is recorded. The red signal erases the past record and requires starting anew.

CAN YOU USE $50?

Then here's an opportunity to get it.

Send one of your ideas to FOOD ENGINEERING.

Each month $50 is presented to someone like you for the best item in this department. And the chance that it will be you is now running about one in twelve.

Also, $5 to $15 is paid for each contributed item used. So a few minutes time may net you as high as $65.

Just send us the facts about your idea and its application. And include a free-hand sketch or snapshot to illustrate it.

We'll do the finished writing and drawing for you. Send it today, before you forget. Address it to Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.—The Editors

JULY PRACTICAL IDEA WINNER was "Sure Inspection With Luminous Light", submitted by Raymond P. Benton, Lighting Engineer, Pacific Gas & Electric Co., San Leandro, Calif.

a COLORIMETER-SPECTROPHOTOMETER for *Only* $240 with 41 calibrations!

NEW BAUSCH & LOMB Spectronic 20 COLORIMETER

Save money on faster, more accurate readings . . . dial sets wavelength instantly, no filters. Save on low purchase price . . . on long, trouble-free use.

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- **All-new trouble-free electronic design**
- **Functional beauty—space-saving, only 14½" wide**

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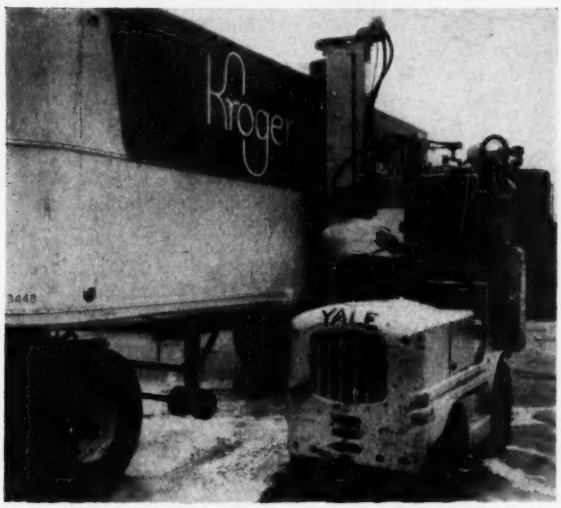
● NOW, for the first time, you can get highest accuracy readings in just *seconds* . . . anywhere in the 375$m\mu$-950$m\mu$ range* . . . with a low-cost colorimeter! CERTIFIED-PRECISION diffraction grating saves time and bother: no need for color filters. A twirl of a knob instantly selects desired wavelength. Narrow band pass (only 20$m\mu$!) assures high spectral purity for dependable analysis. You get double use, double value—routine colorimetry *plus* interpretive spectrophotometry—all at the same low price. Trouble-free service for years! Revolutionary new electronic design provides stability, resists shock and temperature variation.

BAUSCH & LOMB
SINCE B&L 1853

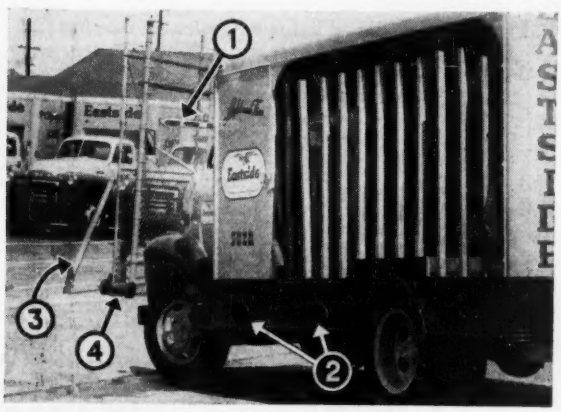
*With Infra-Red Accessories (Only $5 More)

Result obtained at Miller's, greatly helped by this safety stimulant, has been a very enviable accident frequency rate —not only in the brewing industry, but for practically any branch of the food industry. The brewery's rate of 4.5 per million man hours during 1953 was reduced to 2.57 during the first four months of 1954.—*James E. Seidcheck, Miller Brewing Co., Milwaukee.*



Portable Shower-Bath for Trucks

For daily truck body and trailer wash-up at Kroger Co. branches, where permanent washing installations are not justified, portable washing machines, mounted on fork lift trucks, provide the daily baths. A rotating brush on vertical shaft scrubs sides as they are sprayed.—*Fleet Owner Magazine, McGraw-Hill Publishing Co., Inc.*



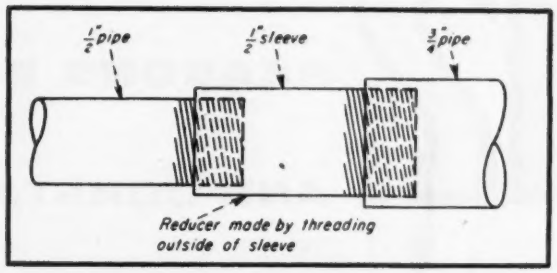
Safety Measures and Aids

Lighted arrow—(1) in photo—on Pabst Brewing Company truck signals a left turn, promoting thereby both truck and driver safety.

Reinforced openings (2) in skirts provide safe footing for mounting to truck or for loading, unloading.

Bent pipes (3) at drive entrance protect truck fenders and also the gate and fence posts.

Rubber-tired casters (4) facilitate rapid and easy opening and closing of heavy metal gate.—*FE Staff.*



Reducer Made From Pipe Sleeve

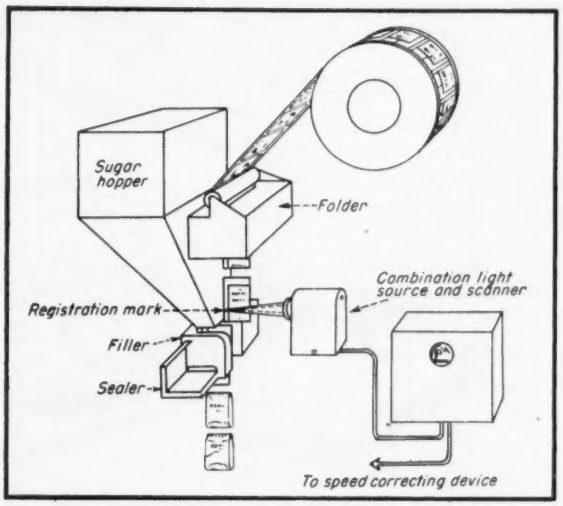
In emergencies we have found pipe sleeves can be readily converted into reducers.

Here's an example of how we do it:

If we are installing a ¾ in. pipe line and we want to reduce it to ½ in., we take the sleeve of the ½ in. line and chase on one end a ¾ in. thread.

One way to do this is to screw the ½ in. sleeve onto a short length of ½ in. pipe, and use a ¾ in. die to chase threads on the outside of the sleeve.

This simple method can be applied to larger or smaller pipe, of either the standard or galvanized types.—*Russell W. Wilson, L. G. Potato Chip Co., York, Pa.*



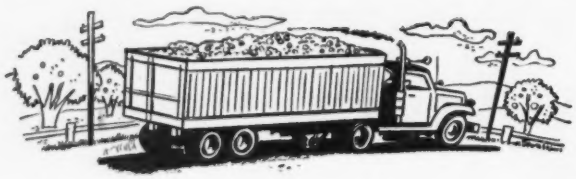
Printed Envelope-Package Indexing

The use of preprinted rolls of web from which envelope-packages are formed as filled, presents real problems in filling, cutting and sealing the envelopes all in register with the printing on the web.

Solution is simplified by the use of a standard high-speed, high-sensitivity photoelectric control (see sketch) which scans the webbing to locate a registration mark, printed at the same time the labels are printed.

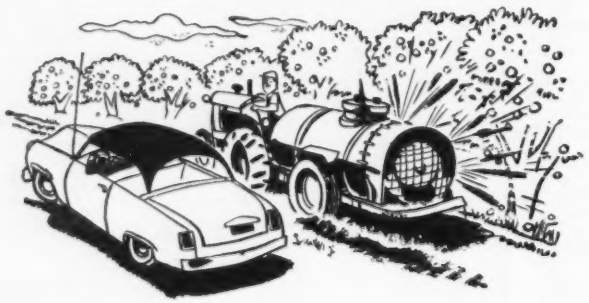
The photoelectric equipment operates in conjunction with an articulated linkage in the paper drive in such a fashion that if the registration mark is not viewed by the scanner at the time of the filling, cutting and sealing operations, the web drive is speeded up until the registration mark does appear at the time that the operations take place. In this way a completely automatic indexing operation which turns out between 7,000 and 9,000 packages per hour, can be maintained.—*Photoswitch, Inc., Cambridge, Mass.*

12 REASONS FOR G-E 2-WAY RADIO AND CONSTANT "HOUSE" CONTROL



- Co-ordinate the flow of produce for processing
- Eliminate deadheading . . . obtain payloads every trip
- Gear your picking to "house" capacity perfectly
- Unify all sales, loading and produce operations

- Convert idle hours to picking time
- Re-route crews and equipment
- Control harvested *quantity*—reduce spoilage
- Relay new orders to fields instantly



- Insure top *quality* via contact with field buyers
- Start or stop work in seconds
- Speed vehicle repairs . . . dusting . . . fertilizer etc.
- Know crop maturity virtually as fast as the field does

Actually, there's no limit to the number of ways mobile radio will improve food processing efficiency. You can think of a dozen more than those listed here. And, each can save one or one thousand man-hours . . . a hundred or many hundreds of dollars depending on the size of your operation.

For completely new processing efficiency, see General Electric 2-way radio communications in action. Compare performance . . . compare features of all mobile equipment and watch the points pile up for G.E. A phone call now to our local sales office is the first step . . . the right step toward achieving *constant control.* Or write: *Section X7094, General Electric Company, Electronics Park, Syracuse, N. Y.*

2-WAY MOBILE RADIO

FREQUENCY STABILITY & SELECTIVITY
guaranteed for life!

Progress Is Our Most Important Product

GENERAL ELECTRIC

The season for SUCARYL®

(Cyclamate, Abbott)

is 12 months long!

There's no "closed season" for overweights on watching calories. It's a year 'round problem. Help answer that problem with SUCARYL-sweetened foods and you've got a year 'round market!

It's a *big* and *ready* market. *Big* because there are 25 million overweights. *Ready* because practically every diet-conscious person knows about SUCARYL . . . knows it offers *true sugar-like sweetness without added calories or tell-tale bitterness.*

It's a *growing* market, too—and now's the time to start your line of plus-profit SUCARYL-sweetened products growing with it. Why not check into it today. Chemical Sales Division, Abbott Laboratories, North Chicago, Illinois. Abbott

Get all the facts!

Write for your free copy of "Making the Most of the Dietetic Market with SUCARYL."

For more information, use coupon on page 227.

NOW...MACHINE APPLICATION OF DU PONT CEL-O-SEAL BANDS

REG. U. S. PAT. OFF.

Now... the development of machines for the completely automatic application of Du Pont "Cel-O-Seal" bands opens new possibilities for improved packaging...with practical economy!

Colorfully printed "Cel-O-Seal" bands add that extra touch of eye appeal to your package . . . promote brand identification . . . let you put your sales slogan or selling message where it must be seen. And they give your product extra, tamperproof protection. Consumers recognize "Cel-O-Seal" as the sign of a protected, high-quality product.

Find out more about the new package improvement possible with "Cel-O-Seal." Write for the names of suppliers of automatic banding equipment. And to see what "Cel-O-Seal" can do for *your* bottle, send us a labeled dummy of your bottle. Our packaging experts will band it, return it for your inspection. Write: E. I. du Pont de Nemours & Co. (Inc.), "Cel-O-Seal" Section FE, 10-414 Nemours Bldg., Wilmington 98, Delaware.

"Cel-O-Seal" cellulose bands are also sold by Armstrong Cork Co., Lancaster, Pa., and on the West Coast by I. F. Schnier Co., San Francisco, California.

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

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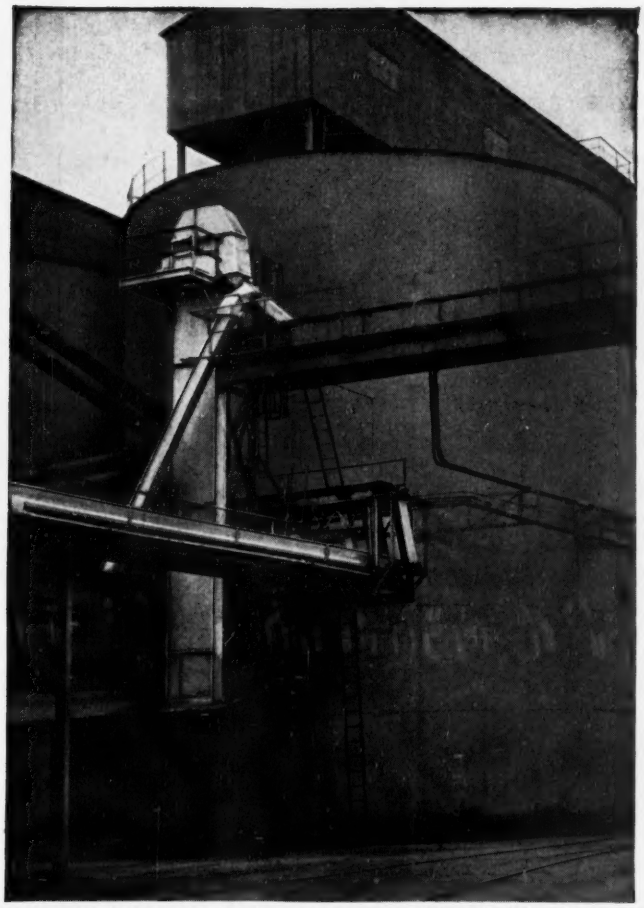
How to lower the cost of elevating



Let LINK-BELT recommend the bucket elevator that meets your requirements from 13 types in 4 basic designs

WANT to cut your cost of raising materials to processing machinery or to storage bins or silos? Regardless of the capacity required — or the characteristics of your material — there's a Link-Belt Bucket Elevator for the job.

Working with this broad line, Link-Belt engineers can select the one best-suited to your needs. A wide range of sizes on chains or belts is available.

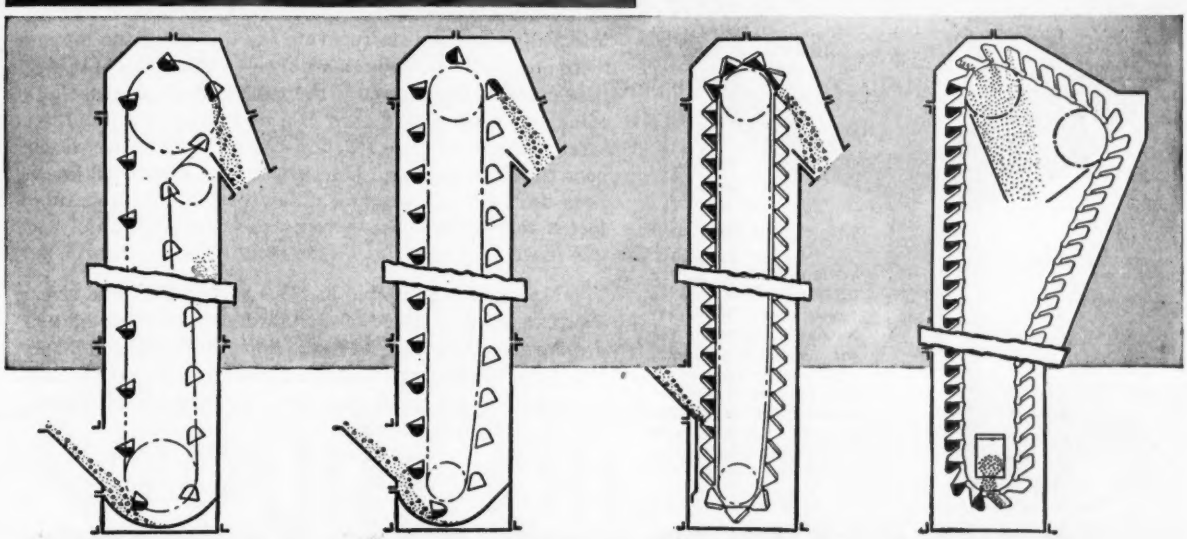
What's more, installation, maintenance and operating costs are low with Link-Belt Bucket Elevators. Rigid, jig-built casings are self-supporting, need only occasional lateral tie-ins depending on height. You have quick access to both head and boot for periodic inspections. Simple screw or gravity take-ups maintain chain or belt tension at all times.

There's an experienced materials handling engineer in the Link-Belt office near you. Call him for complete information.

LINK-BELT

BUCKET ELEVATORS

◀ Midwest soybean oil mill uses several combinations of Link-Belt Bucket Elevators and Screw Conveyors to insure smooth flow of beans throughout process.



Positive discharge
for light, fluffy, fragile or materials that tend to stick to the buckets.

Centrifugal discharge
for free-flowing, fine or loose materials with small to medium lumps.

Continuous discharge
for range of materials —light to heavy, small to large, abrasive lumps.

Internal discharge
for gentle handling of small articles such as pellets, seeds, castings.

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities. 13,258

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EASY TO SERVICE...

a plus value of ASHCROFT *Maxisafe* DURAGAUGES

Turn the knob on the back of the *Maxisafe* and the plate comes off, fully exposing the entire mechanism for fast and easy inspection, recalibration or adjustment. This time and money-saving feature is highly favored wherever Ashcroft *Maxisafe* Duragauges are in service.

This Duragauge was named *Maxisafe* because it has an integrally-cast wall to separate the dial from the movement and Bourdon Tube assembly — a solid wall of safety that protects the viewer if the tube ever ruptures. Covering the back of the case is a double spring mounted safety release plate — a Teflon-coated plate tightly fitted on a rubber gasket and held in place by a knurled knob. Less than 0.5 psi pressure created by a ruptured tube forces this cover open — vents the discharge safely to the rear.

The Maxisafe is available in 4½", 6" and 8½" dial sizes. You can have a choice of standard Ashcroft Duragauge pressure ranges, case designs (except Types 1179 and 1279), and mountings. Get the utmost in sustained accuracy, durability, protection and convenient servicing. Specify Ashcroft *Maxisafe* Duragauges.

YOUR INDUSTRIAL SUPPLY DISTRIBUTOR has complete facts about Ashcroft Gauges of all types. You can depend on his knowledge and experience to help you satisfy every requirement of the application. He maintains local stocks to serve you promptly and economically.

ASHCROFT 1850 U.S.A.

ASHCROFT GAUGES

MANNING MAXWELL & MOORE TRADE MARK

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'ASHCROFT' GAUGES, 'AMERICAN' AND 'AMERICAN-MICROSEN' INDUSTRIAL INSTRUMENTS, 'HANCOCK' VALVES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, AIRCRAFT PRODUCTS. BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

How many dimes can YOU save

from every lubrication dollar?

Simplify and Save the Pure Oil way

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Be sure with Pure—Sales offices located in more than 500 cities in Pure's marketing area.

Now's the time to start tightening up on production and maintenance costs. And the place to start—one place where really dramatic savings often can be made—is on *lubrication*.

Pure Oil multi-purpose lubricants—*the specially-formulated lubricants that do many different jobs equally well*—enable you to make a six-way savings that amount to real money. What's more, your lubrication program becomes *surer*, simpler, more efficient . . . saves time, saves machines, saves money!

For complete information on this cost-cutting program, clip out the coupon and mail it today. It's the first step toward big lubrication savings!

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Please send me your free booklet on how to "Simplify and Save."

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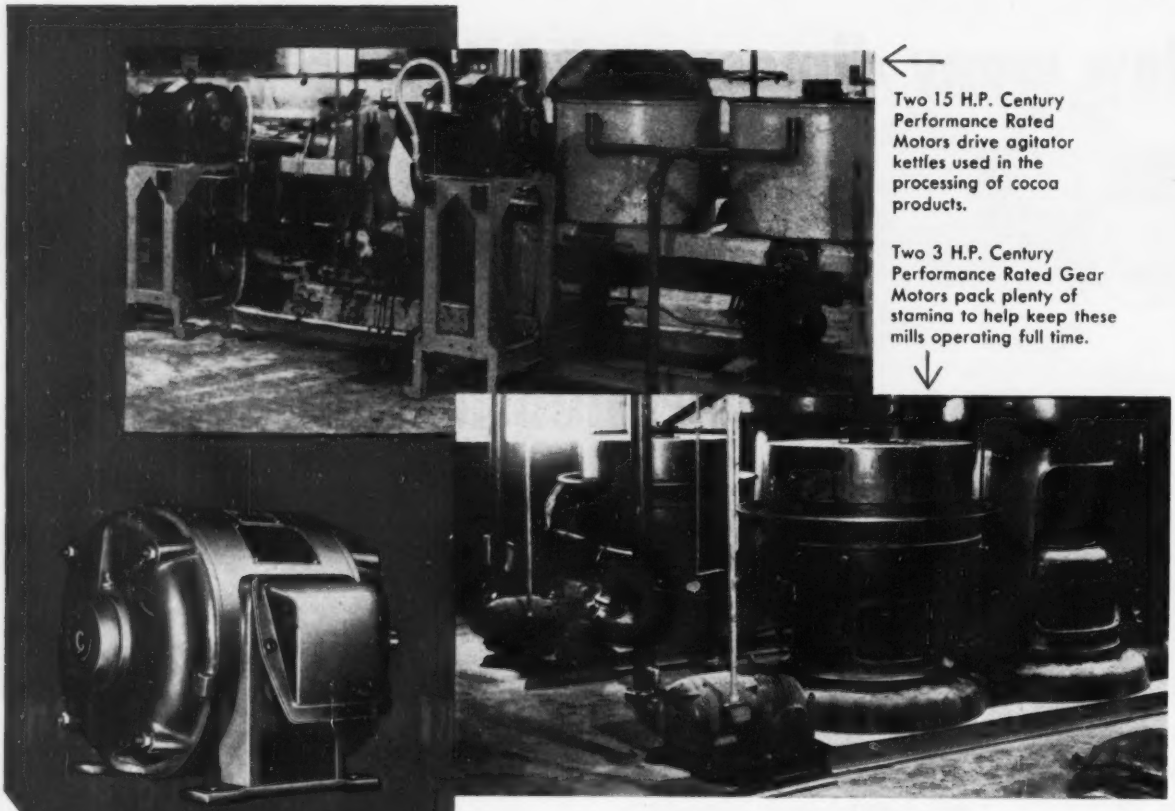
CITY_____ ZONE_____ STATE_____



Two 15 H.P. Century Performance Rated Motors drive agitator kettles used in the processing of cocoa products.

Two 3 H.P. Century Performance Rated Gear Motors pack plenty of stamina to help keep these mills operating full time.

Century

Performance-Rated© MOTORS CHANGE DOWN-TIME INTO WORK-TIME

- Century Motors are Performance Rated to match the needs of your job. From the wide range of types and sizes, you can select motors that are precisely right for your jobs—motors with proper torque and speed, with adaptable mountings and correct frames to fit your applications.
- When you pick rugged Century Performance Rated Motors, you get the kind of stamina that stretches work-time . . . shrinks down-time.
- Many leading manufacturers of conveyors, pumps, agitators and other types of processing equipment know that this cost-cutting reliability helps produce satisfied customers. That's why they recommend Century Performance Rated Motors.
- Select the motors to fit your needs from Century's Performance Rated Line: 1/8 to 400 H.P. . . . AC and DC, single phase and polyphase . . . drip proof, splash proof, dust proof and explosion proof frames, plus optional corrosion-resistant features . . . constant speed, multi-speed, adjustable varying speed and adjustable speed in fine steps over a wide range . . . Century Gear motors with Duti-Rated gears.

Performance-Rated© Century C MOTORS

1/8 to 400 H.P.

Call a Century District Sales Office or your nearest Century Authorized Distributor

CENTURY ELECTRIC COMPANY

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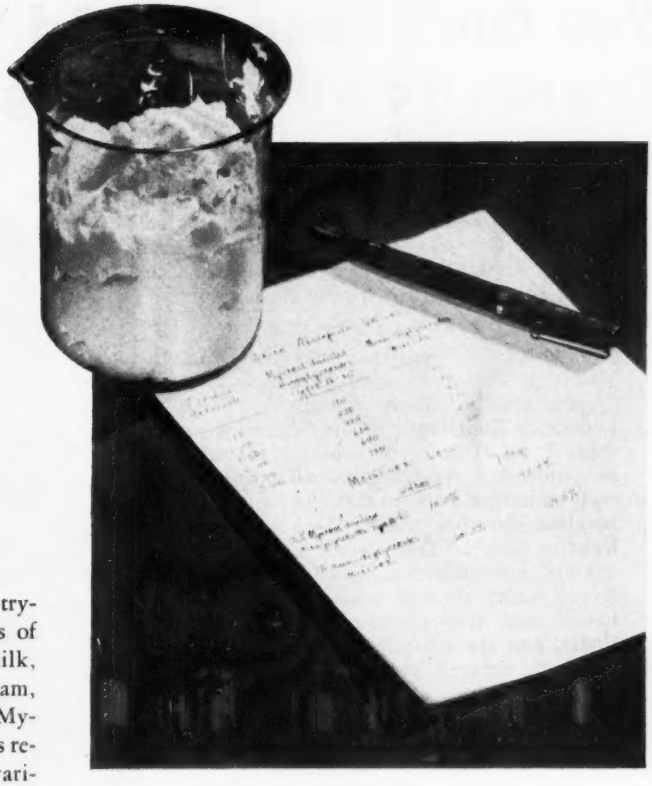


Monoglycerides and whippability

Fellow in our Research Laboratories keeps trying to improve the whipping properties of evaporated milk, sweetened condensed milk, homogenized milk, light cream, medium cream, and reconstituted dried cream by adding Myverol® Distilled Monoglycerides to them. His results point up some differences between the various Myverol types we make that will be interesting to those developing food specialties based on milk products.

For instance, *Type 18-85*, which we make from refined cottonseed oil, cuts the whipping time without much effect on overrun (excess of finished volume over starting volume). Contrariwise, *Type 18-00*, from hydrogenated lard, boosts the overrun without affecting the whipping time.

When our man used mixtures of the two types, each contributed its own special properties. That is, he obtained high overrun and short whipping time. Then he tried *Type 18-30* (from edible animal fat) and found that it combined the high overrun and low whipping time in optimum fashion.

If large amounts of these monoglycerides were involved, there'd be nothing remarkable about their difference in behavior, but we are here dealing with 1% levels of addition at most. Apparently DPi's unique molecular distillation method of concentrating the active mono out of the usual mono-di reaction mixtures results in an excellent emulsifier or whipping agent. For this conclusion we have a great deal of other evidence too, from other applications.

Little would please our Research Laboratories more than to share the details of this data with anyone entertaining new ideas about dairy-based dessert toppings. Or a lot of other data about a lot of other possibilities opened up by the various kinds of Myverol Distilled Monoglycerides. ***Distillation Products Industries,*** Rochester 3, N. Y. Sales offices: New York and Chicago • W. M. Gillies and Company, Los Angeles and San Francisco • Charles Albert Smith Limited, Montreal and Toronto.

distillers of monoglycerides made from natural fats and oils

DPi

Also... vitamins A and E

Distillation Products Industries *is a division of* **Eastman Kodak Company**

For more information, use coupon on page 227.

You Can't Read This Ad Without Visualizing Tremendous Savings in Your Plant

If the handling of bulk materials is required in your plant, be they raw, finished, moist, liquid or rubbish materials, read these simple facts about the Dempster-Dumpster System. Then, visualize its application and tremendous savings possibilities in your own operation.

VISUALIZE HAVING ONLY ONE TRUCK with scores of bodies. One truck-mounted Dempster-Dumpster with only one man, the driver, serving many detachable Dempster-Dumpster Containers. These containers range from 2 to 21 cu. yds. capacity for use with recommended type Dempster-Dumpsters, and each container built to suit the materials to be handled—be they solids, liquids, dust, bulky, light or heavy. You place a container at convenient materials accumulation points, in or out of plant. As each is loaded, it is picked up, hauled and dumped, or the load is set down intact, and the entire operation is handled by hydraulic controls in cab by only one man, the driver.

The photographs above were made in the plant of one of the nation's leading brands of soaps and dentifrices. This installation comprises a single Dempster-Dumpster and 49 containers. Photos illustrate the simple one man pick up, hauling and dumping operation of a drop bottom container.

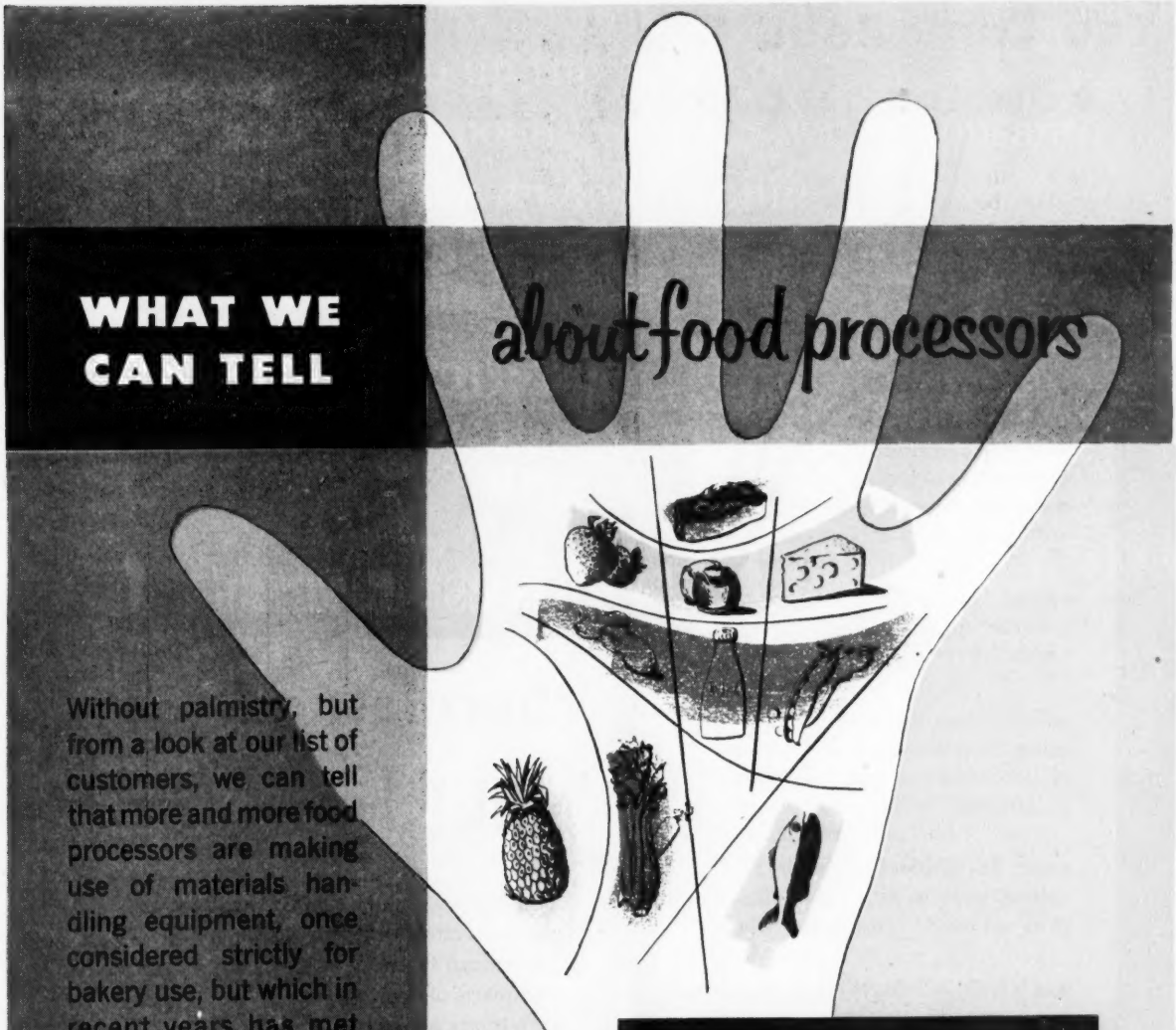
THE NATION'S LEADING FIRMS USE THIS SYSTEM BECAUSE OF ITS AMAZING EFFICIENCY AND TREMENDOUS SAVINGS.

YOU ELIMINATE trucks standing idle . . . eliminate re-handling of materials . . . eliminate loading crews. You increase efficiency, sanitation and good plant-keeping with this amazing Dempster-Dumpster System—the lowest cost method of bulk materials handling ever devised. Write us now for complete information. Manufactured and sold exclusively by Dempster Brothers, Inc.

One Truck-Mounted Dempster-Dumpster Handles Scores of Containers . . . All Designs . . . All Sizes

DEMPSTER BROTHERS, 794 Shea Bldg., Knoxville 17, Tennessee

WHAT WE CAN TELL about food processors

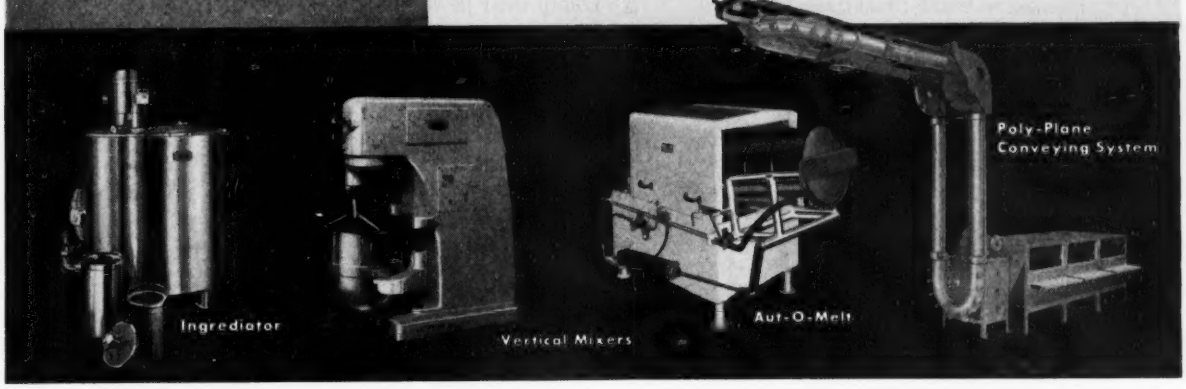


Without palmistry, but from a look at our list of customers, we can tell that more and more food processors are making use of materials handling equipment, once considered strictly for bakery use, but which in recent years has met with continued acceptance and endorsement by food processors throughout the industry.

READ STANDARD CORPORATION
Bakery-Chemical Division
York, Pa. • Los Angeles 39, Calif.

READ STANDARD CORPORATION

We'll predict that if you have a materials handling problem, you'll find a solution by writing Read Standard for further information.



For more information, use coupon on page 227.

"Another product safely shipped in Inland PROTECTION-EERED* *containers"*

The Krim-Ko cow gives chocolate milk!

Each 55-gallon drum that takes Krim-Ko dairy chocolate flavoring to market holds enough flavoring to make over *2,640* quarts of delicious chocolate drink. That's pretty good production for any cow!

Since Krim-Ko chocolate is sold exclusively to dairies, it must meet the rigid purity and uniformity requirements set up by the dairy industry. That's why *quality-control* is the watchword at the Krim-Ko Corporation. And that's why the people at Krim-Ko have used Inland Steel drums to ship their product for many years. They know they can rely on specially lined Inland containers to deliver to their customers quality "as packaged."

If quality control during shipment or storage is a problem with your company, why not let Inland develop a "protection-eered" container for your product?

Food Division, Dept. A

INLAND STEEL CONTAINER COMPANY

Division of Inland Steel Company

6532 S. Menard Ave. • Chicago 38, Ill.

Plants: Chicago • Jersey City • New Orleans

"It's Better to Ship in Steel"

**The right container, with the right protective lining for your product*

For more information, use coupon on page 227.

For Increased Sales...

Pep up the flavor of compound coatings with Monsanto Ethavan and Vanillin

To put new zest into your hard butter coatings try Monsanto Ethavan or Vanillin. They are particularly important because hard butter coatings absorb more flavor than older-type cocoa butter coatings.

Better still, Monsanto Ethavan and Vanillin have high "staying power," retain their flavor during hot processing.

Monsanto Ethavan and Vanillin come to you in the form of pure, fine crystals and can be added to a compound without diluting or lowering the viscosity.

Next time, add either of these two fine products to your formulation or specify them to your flavor supplier.

For more information on the use of these ingredients in compound coatings, call the Monsanto office near you, or write: Organic Chemicals Division, MONSANTO CHEMICAL COMPANY, Box 478, St. Louis 1, Missouri.

Ethavan: Reg. U. S. Pat. Off.

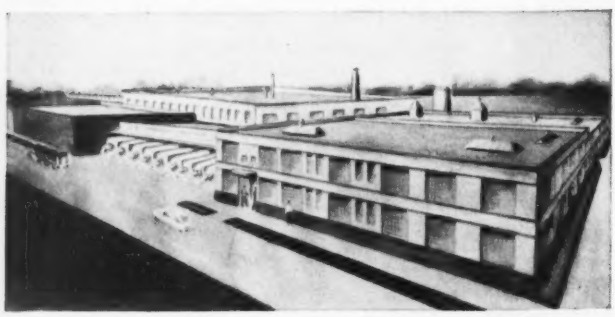
MONSANTO

SERVING INDUSTRY WHICH SERVES MANKIND

For more information, use coupon on page 227.

This "Smoking Habit" Pays Off!

Each of these Foxboro Automatic Temperature/Humidity Controllers handles one "house" at the Mouret Packing Company, Opelousas, La. This modern Beef and Pork U. S. Government Inspected Slaughtering Plant processes a full line of beef and pork products . . . depends on the versatility of Foxboro Control to follow varied smokehouse schedules precisely.



. . . Foxboro Automatic Control of Temperature and Humidity

- minimizes shrinkage
- cuts processing costs
- upgrades quality

You can realize brand new savings in product weight, smokehouse time, and fuel through the use of Foxboro Temperature/Humidity Controllers. Curing is easier . . . you never have to worry about condensation or shrinkage. You can quickly set these simple, compact Controllers to automatically hold the best heat/moisture ratio for *any* given smokehouse operation. They assure fine color, flavor, and texture for every product from franks to hams. In addition, you get clear chart records that make exact repetition of any schedule easy.

Foxboro Temperature/Humidity Controllers are also available with automatic process *time* control . . . the ultimate in air-conditioning automaticity. Write for Descriptive Data Sheet No. 200-14.

THE FOXBORO COMPANY, 309 NEPONSET AVE., FOXBORO, MASS., U.S.A.

FOXBORO
REG. U. S. PAT. OFF.

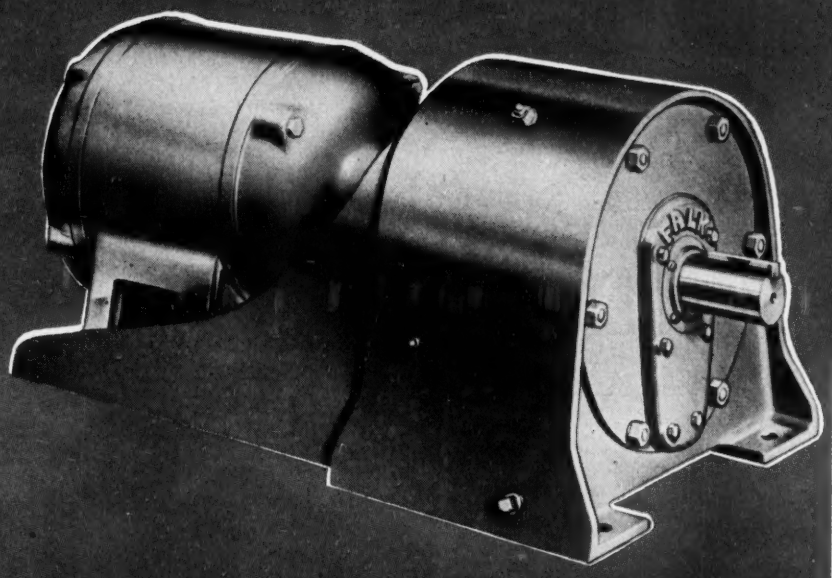
AUTOMATIC
TEMPERATURE/HUMIDITY
CONTROL

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

Choose the All-Motor type,

ALL-STEEL FALK Motoreducer

...with complete foot-mounted motor of ANY make ANY type ANY speed



Its exclusive, superior features mean LONG-RANGE ECONOMY!

You get more for your money in a FALK all-steel, All-Motor type Motoreducer. Here is the *only* compact motorized reducer with a separate foot-mounted, resilient Steelflex coupling-connected, standard motor without modifications! It accommodates *any* make, type, or speed of motor within the AGMA rating of the unit. Ratio can be changed within torque capacity of unit without modifying motor.

The simplified construction of the FALK All-Motor type Motoreducer means real long-range economy. Motors or reducer units can be quickly and easily interchanged from one line or plant location to another. Fully standard replacement motors from manufacturers' field stocks are always available without costly delivery delays or special motor or shaft modifications.

When you choose a FALK All-Motor type Motoreducer, you get the utmost in design, versatility of performance, and utility—plus the greatest possible dollar-for-dollar value throughout its traditionally long life... Available in any standard ratio from factory and distributor stocks throughout the country. Write for Bulletin 3104.

FALK ...a good name in industry

THE FALK CORPORATION 3001 W. Canal St. Milwaukee 8, Wis.

Every FALK motoreducer has these "IN-BUILT" FACTORS

1 **All-steel Housings.** Unbreakable, strong, rigid. Generous overhung load capacities provided by wide bearing spans, large shafts and bearings.

2 **Streamlined inside and outside.** Smooth, clean surfaces; machine welded construction conforms to NEMA motor frames.

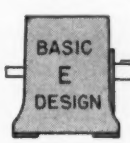
3 **Sealed Housings.** Dual closures and one-way vents keep oil *in*, dust and moisture *out*. Units are splashproof, leakproof, dustproof.

4 **Positive Lubrication.** Large sump capacity ...oil-tight construction assures clean lubricant...direct dip of revolving elements provides positive lubrication at all speeds.

5 **Wide Speed Range.** Selective ratio combinations provide output speeds from 1.5 rpm to 1430 rpm with stock gears.

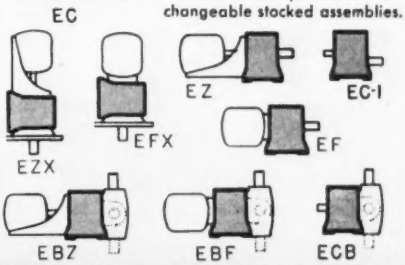
6 **Precision Gearing.** Heat-treated alloy steel, precision cut and shaved helical gearing throughout...quiet-operating crown shaved pinions...taper bored gears for easy ratio changes.

• • •



EC

The basic E design permits maximum use of standardized parts . . . closer control over materials, processing, inspection and assembly . . . resulting in faster delivery from interchangeable stocked assemblies.



WRITE FOR BULLETIN 3104

It's the Nash!

The ability of Nash Compressors to maintain original performance over long periods is no accident. Nash Compressors have but a single moving element, the Nash Rotor. This rotor is precision balanced for long bearing life, and it revolves in the pump casing without metallic contact. Internal lubrication, frequent cause of gas contamination, is not employed in a Nash. Yet, these simple pumps maintain 75 lbs. pressure in a single stage, and afford capacities to 6 million cu. ft. per day in a single compact structure.

Nash Compressors have no valves, gears, pistons, sliding vanes or other enemies of long life. Compression is secured by an entirely different principle of operation, which offers important advantages often the answer to gas handling problems difficult with ordinary equipment.

Nash Compressors are compact and save space. They run without vibration, and compression is without pulsation. Because there are no internal wearing parts, maintenance is low. Service is assured by a nation-wide network of Engineering Service offices. Write for bulletins now.

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature Automatically maintained.

Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

NASH ENGINEERING COMPANY

312 WILSON, SO. NORWALK, CONN.

IMITATION
RASPBERRY
by FIRMENICH

gives finer flavor...
greater sales appeal...
to your products

You get the direct and authentic reproduction of raspberries in their full perfection in Raspberry Flavor by Firmenich. For Firmenich took fully ripe raspberries, freshly severed from the stem, captured their delicate and fugitive flavor, and by original research reconstructed it in all its significant and desirable components. Firmenich Raspberry comes to you as a precise and potent flavor material of the utmost purity and stability to enhance the flavor of your products and to make them more attractive to your customers.

250 WEST 18th STREET, NEW YORK 11, N. Y.

CHICAGO OFFICE: 612 NORTH MICHIGAN AVE.
FIRMENICH OF CANADA, LIMITED, 348 WALLACE AVE. • TORONTO
GENEVA • PARIS • LONDON

Packaging Irregular Shapes and Sizes!

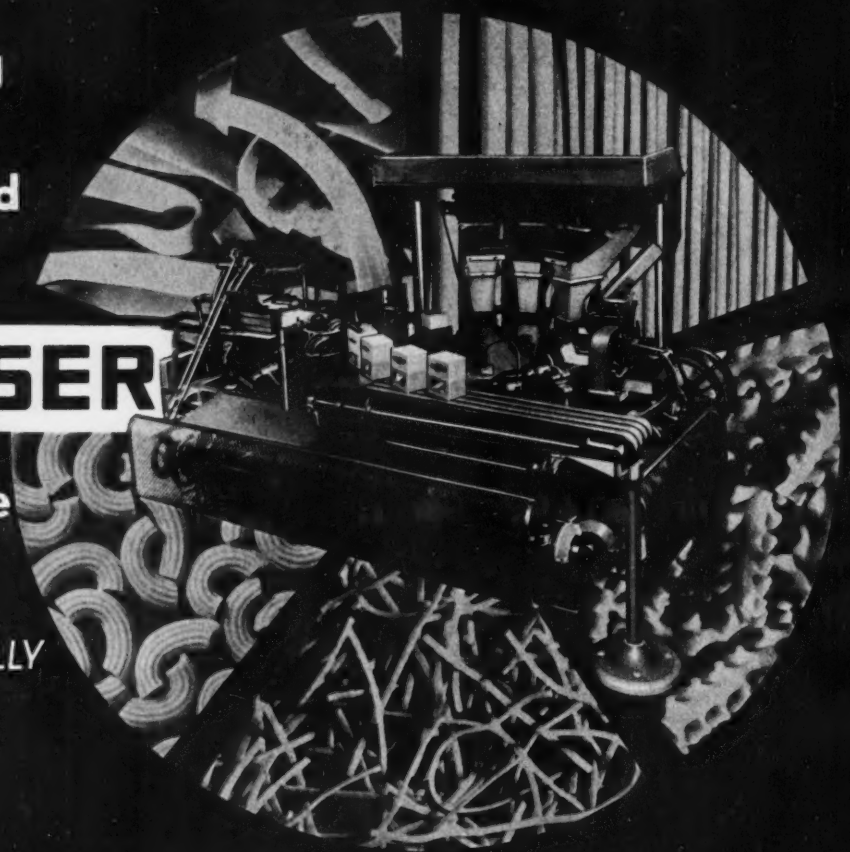
HESSER

can handle them

ECONOMICALLY

EFFECTIVELY

QUIETLY



with

- Special weighing devices for different products
- Semi-automatic weighers for long paste goods, special shaped paste goods
- Volumetric filling heads for handling irregular shapes, such as crystal starch
- Special devices for handling sticky products, hygroscopic products, incorporated in fully automatic packaging machines

Machines built by

FR. HESSER

MACHINE BUILDERS AG.
Stuttgart-Bad Cannstatt
Germany

There's hardly a problem in packaging for which **HESSER** doesn't have an automatic machine, or an attachment, that will handle it effectively and at low cost. **HESSER** offers machines for the automatic weighing, packaging, wrapping of sugar, coffee, candies, soap and other powders, tobaccos, cigars, edible fats in tablet or cube form . . . foods of all varieties.

These amazingly versatile machines make the package in any material you choose — with an inner lining if you need one —, measure the product, and fill and seal the package. Their helical gears, running in an oil bath, provide new standards of quiet operation and long life. Whatever your packaging problem, write today and tell us as much about it as you can; let us make recommendations.

HESSER makes a complete line of machines for weighing, wrapping, bundling, printing and packaging

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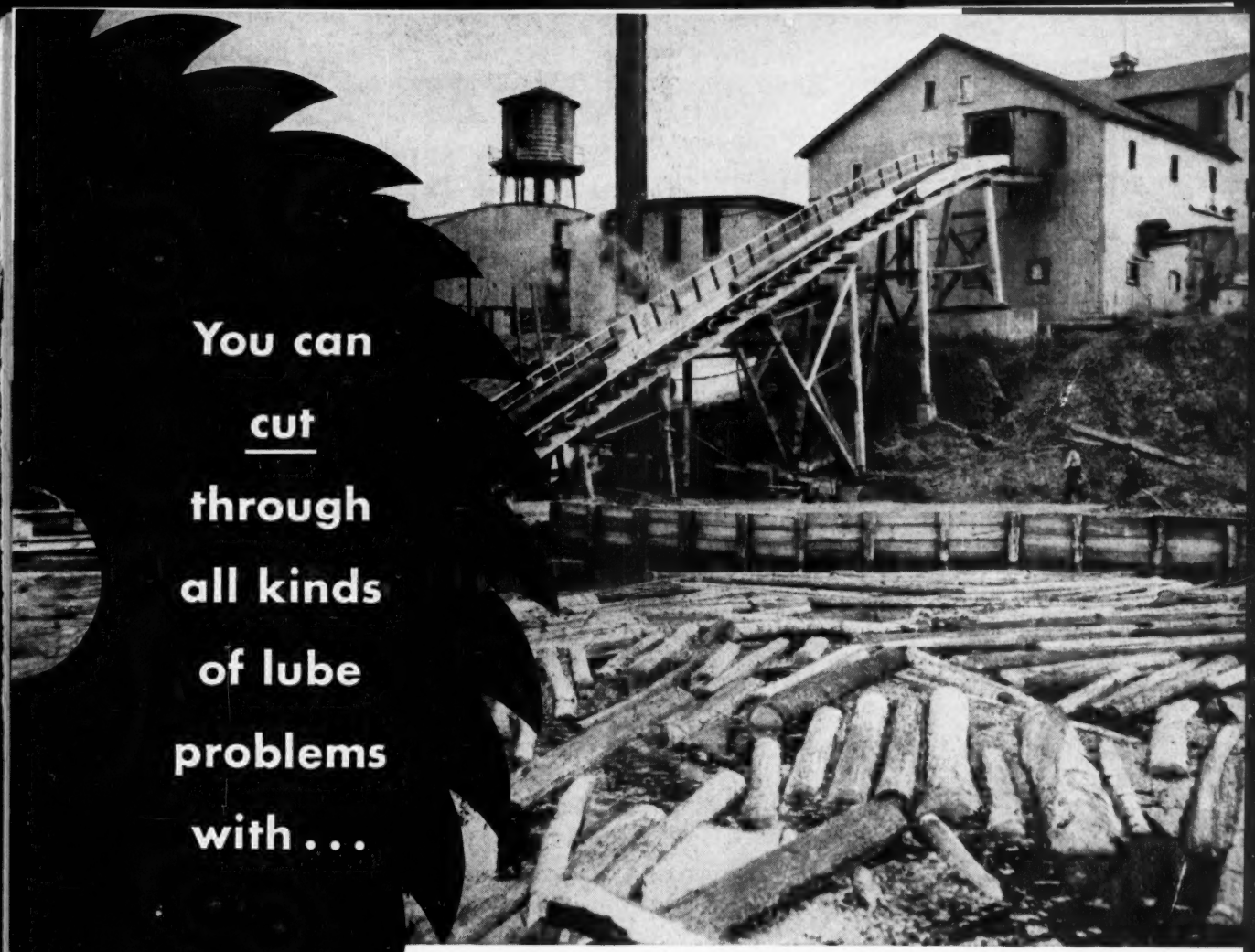
Hugo Schoener
Mexico 1 D.F. Avenida Madero 6

For more information, use coupon on page 227.



You can cut through all kinds of lube problems with . . .

STANODRIP Dripless Oils

STANODRIP Dripless Oils are particularly suited for use in processing industries (food, rubber, etc.) where possible contamination from oil poses a lubricating problem. If your plant is in the Midwest, there's a trained Standard Oil lubrication specialist nearby who can be of service to you.

● This story about a sawmill describes a problem that is common to many industrial plants. And it tells about a service that solves a thousand and one different problems in the operation of industrial machines.

The sawmill pictured above was having trouble with overheated bearings, as well as with high consumption of oil on these particular bearings. In addition, there was excessive dripping of the oil on the floor, creating a safety hazard.

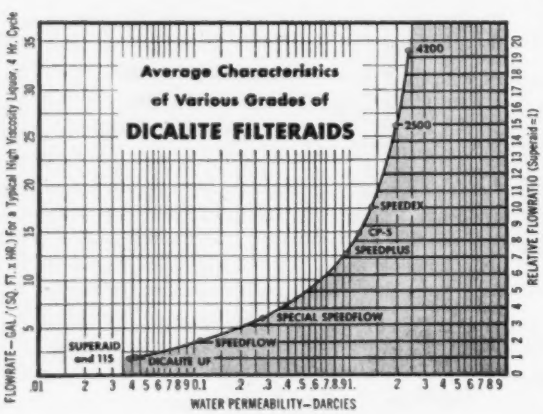
The mill operators asked for the services of the near-at-hand Standard Oil lubrication specialist, C. F. Klenner. He recommended a trial of STANODRIP Oil No. 99, an oil having remarkable dripless qualities and at the same time capable of withstanding high heat.

After a reasonable trial period, inspection revealed that consumption was greatly reduced, bearing temperatures were considerably lower and there were no more oil puddles on the floor. STANODRIP Oil No. 99 was then placed in all line shaft bearings and since then, there have been no bearing failures.

STANODRIP Dripless Oils are part of a complete line of Standard lubricants developed to serve the many machinery lubricating problems of industry. If you want help or information, phone your nearest Standard Oil office or write: Standard Oil (Indiana), 910 S. Michigan Avenue, Chicago 80, Ill.

STANDARD OIL COMPANY STANDARD *(Indiana)*

So "sharp" is the filtration given by this Dicalite filtercake—unwanted solids even down in the submicron range are removed up to 99% —with such high through-put and brilliant clarity, that Dicalite filteraids are used world-wide in processing beverages, oils, foods, sugars, wines, pharmaceuticals and hundreds of other products • In sugar refining, Dicalite filteraids are removing thermophilic bacteria and other impurities; they are taking out activated carbon and bleaching clays from hydrogenated oils (as well as removing every trace of the nickel catalyst); in breweries the world over, Dicalite filteraids are removing yeasts and resins, providing brilliant clarity and longer shelf life to beers and ales • These are a few of the important ways in which Dicalite filteraids are helping food processors to guard and maintain the purity and quality of their products. Chemically inert, sterilized in processing, produced from the finest crude diatomite, Dicalite filteraids provide a full range of products to meet every filtration need. The chart at the left will give you some idea of their scope.

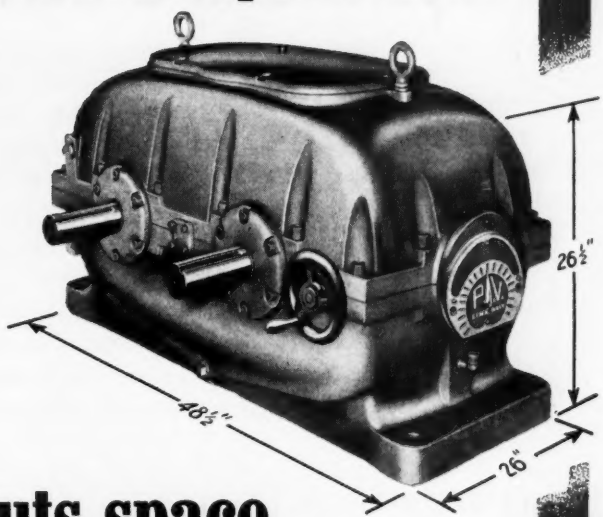


For more complete information on filtration processes, and the uses of Dicalite filteraids, send for Dicalite Bulletin B-12.

DICALITE DIVISION, GREAT LAKES CARBON CORPORATION, 612 SO. FLOWER STREET, LOS ANGELES 17, CALIFORNIA

Dependable GLC GREAT LAKES Dicalite® DIATOMACEOUS MATERIALS

LINK-BELT 25-hp P.I.V. Variable Speed Drive



cuts space requirements up to 50%

LINK-BELT gives you all the advantages of positive, stepless speed changing in high horsepowers, too

ONE of the great advantages of P.I.V.'s positive, all-metal drive is dramatically illustrated by the Size 6. Compared to other speed changers in this hp range, it saves *70 cu. ft. of space!*

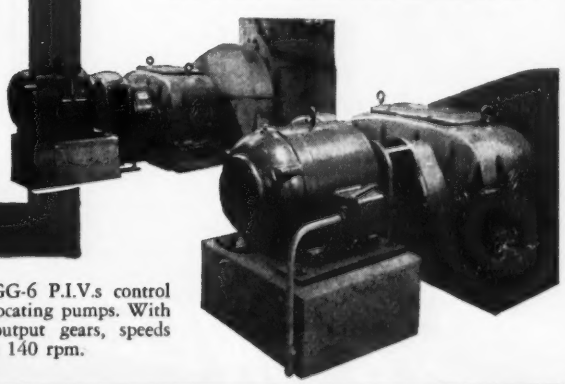
In addition, infinitely stepless regulation means you can select the exact speed you want—from maximum to minimum. Unaffected by temperature and atmospheric conditions, all moving parts are totally enclosed and splash-lubricated.

The Size 6 P.I.V. is built in three types: The basic drive . . . with input *or* output gears . . . with input *and* output gears. All are available in a wide range of ratios, 20 to 25 hp.

Get the facts on the Size 6 from your nearest Link-Belt office or distributor. You'll receive a copy of Folder 2374. And for information on the complete P.I.V. line, ask for Book 2274.

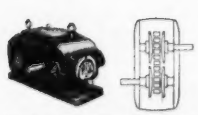
LINK-BELT P.I.V. VARIABLE SPEED DRIVE 13.594

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

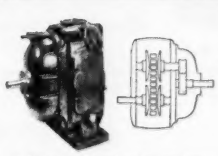


Two Link-Belt HGG-6 P.I.V.s control the speed of reciprocating pumps. With both input and output gears, speeds range from 46.5 to 140 rpm.

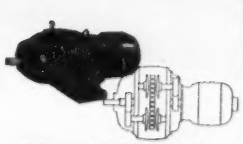
4 OF 16 P.I.V. TYPES
HORIZONTAL OR VERTICAL MOUNTINGS
½ TO 25 HP—
RATIOS TO 6:1



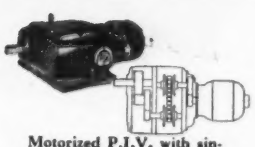
Basic, Positive, Infinitely Variable (P.I.V.) Speed Drive.



P.I.V. with single reduction input or output helical gears.



Motorized P.I.V. with single reduction input and output helical gears.



Motorized P.I.V. with single reduction input and double reduction output helical gears.

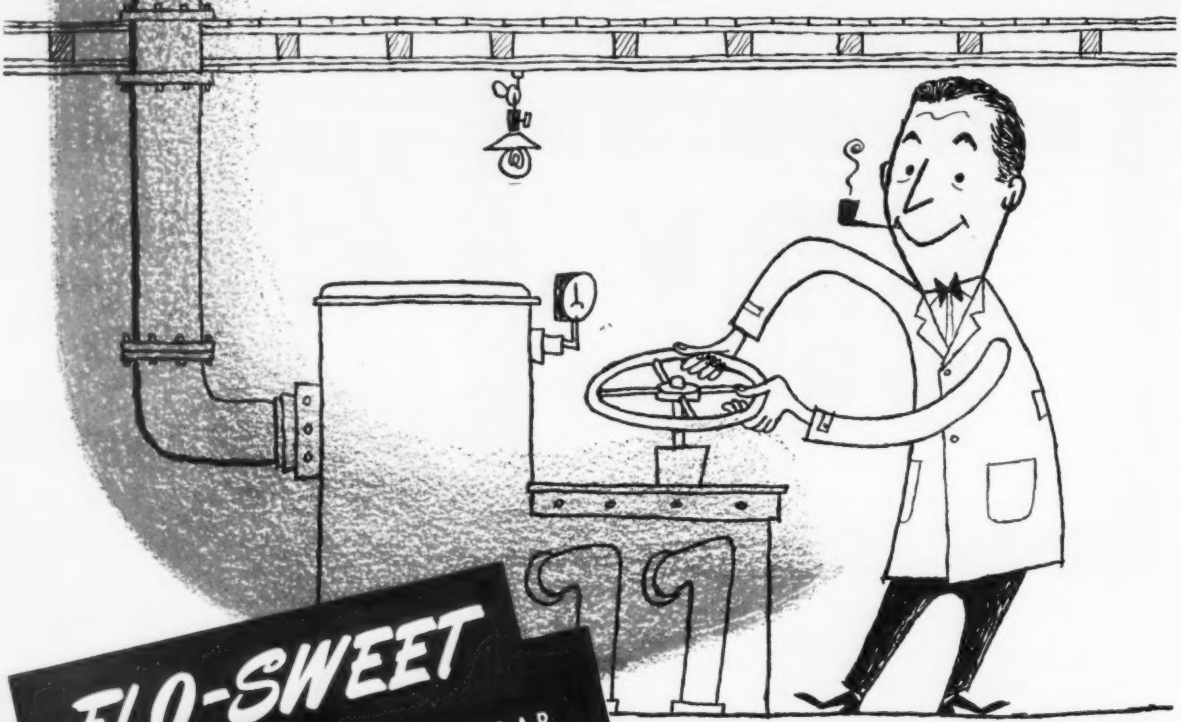
For more information, use coupon on page 227.

How to get your sugar upstairs in a hurry...

"With a liquid sugar system there's never any delay in getting your sugar right where you want it," reminds your Flo-Sweet Engineer. "Whether you're receiving sugar into your plant — transferring it from one department to another — or putting it into process . . . liquid sugar saves you time and labor.

"What's more," adds your Flo-Sweet Engineer, "you're sure of sanitation. You can heat or cool the sugar just the right amount for best results with the processes you're using. And with Flo-Sweet, you get a quality-controlled sugar carefully blended to your particular needs. Why settle for less?"

Your Flo-Sweet Engineer is backed by the research and production resources of the very pioneers in liquid sugar. He may be able to help you make important savings in your own sugar handling methods. Why not consult him?



FLO-SWEET
FIRST IN LIQUID SUGAR

Distributed from Yonkers • Pittsburgh • Toledo • Detroit

REFINED SYRUPS & SUGARS, Inc.
YONKERS, NEW YORK

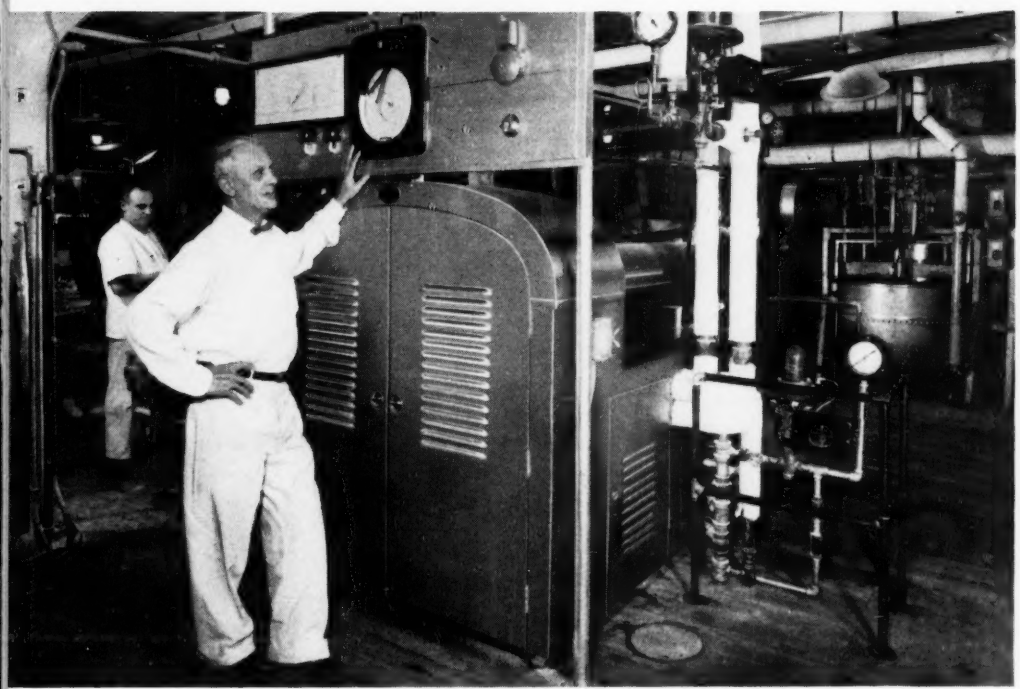
SERVING INDUSTRIAL SUGAR USERS EXCLUSIVELY

Let GIBBLER handle the job all the way

You insure uniform high quality with **Votator**®

CONTINUOUS PROCESSING APPARATUS FOR...

- MIXING
- PASTEURIZING
- STERILIZING
- SLUSH FREEZING
- CRYSTALLIZING
- PLASTICIZING
- WHIPPING
- COOKING
- COOLING
- EMULSIFYING
- AERATING
- ENZYME INACTIVATION



VOTATOR installation at New England Confectionery Company. Changes in flow of starch, steam or water are accurately recorded on chart. Precise, automatic control insures correct temperatures.

Continuous processing is key to improved quality of starch jellies

CONVERSION from batch to continuous processing at New England Confectionery Company, Cambridge, Mass., eliminated variations in quality and uniformity of starch jellies which once were problems. Now, with VOTATOR* Continuous Processing Apparatus, critical cooking and cooling temperatures can be accurately controlled, with desired gel strength, shelf life and clarity of jellies maintained at all times.

Formerly processed in open kettles at 235°F, starch slurry is now cooked under pressure at 285°F, then cooled to 210°F, in the compact VOTATOR unit shown above. Actual cooking time has been cut from 45 minutes per batch to less than 2 minutes. And, up to 4000 pounds of starch jelly is now cooked per hour . . . on a *continuous basis.*

Find out how you can improve the quality of *your* products and increase production efficiency with VOTATOR Continuous Processing Apparatus.

*VOTATOR—Trade-Mark Reg. U. S. Pat. Off.

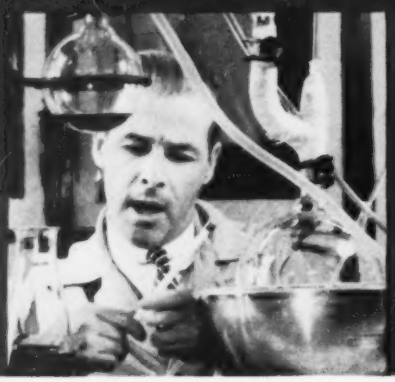
The GIRDLER Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

VOTATOR DIVISION

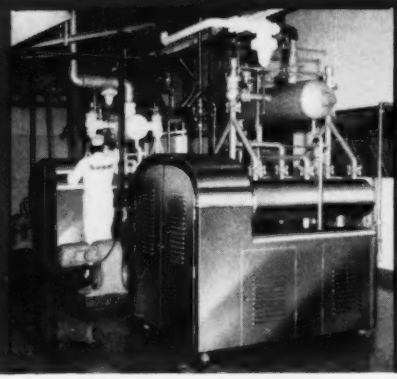
Mail coupon on next page for information

Let GIRDLER handle the job all the way



PROCESS DESIGN

ENGINEERING



INSTALLATION

THESE PRODUCTS CAN BE PRODUCED BETTER WITH VOTATOR CONTINUOUS PROCESSING APPARATUS:

Marshmallows
Cake Batter
Dog Food
Chocolate Milk Drink
Edible Starch (For Salad Dressing)
Pie Filling
Soup
Lard
Margarine
Shortening
Sweetened Condensed Milk
Eggs
Concentrates, Fruits
Juices and Purees
Juice Concentrates
Starch Gum Jellies
Strained Foods

THE BROAD, specialized experience that Girdler offers the food processing industry can give you important benefits in the planning, engineering, and installation of continuous processing facilities. Processing plants from coast to coast testify to the advantages of this complete Girdler service.

VOTATOR Division engineers are well qualified to help you develop your process . . . or build a plant around it. Pilot plant and laboratory facilities are available for development of new processes and equipment—or for special research projects. And, on expansion or modernization of existing plants, Girdler offers cost-plus contracts covering preliminary work.

When you plan a new process or construction of continuous processing facilities, call on Girdler at the start—and insure sound results. Write for this 32-page book which gives you complete information on the application of VOTATOR Heat-transfer Apparatus. Send coupon today for your free copy.

THE GIRDLER COMPANY
224 East Broadway, Louisville 1, Kentucky

☐ Send booklet V-39 describing Continuous Processing.

Name _____

Position _____

Company _____

Address _____

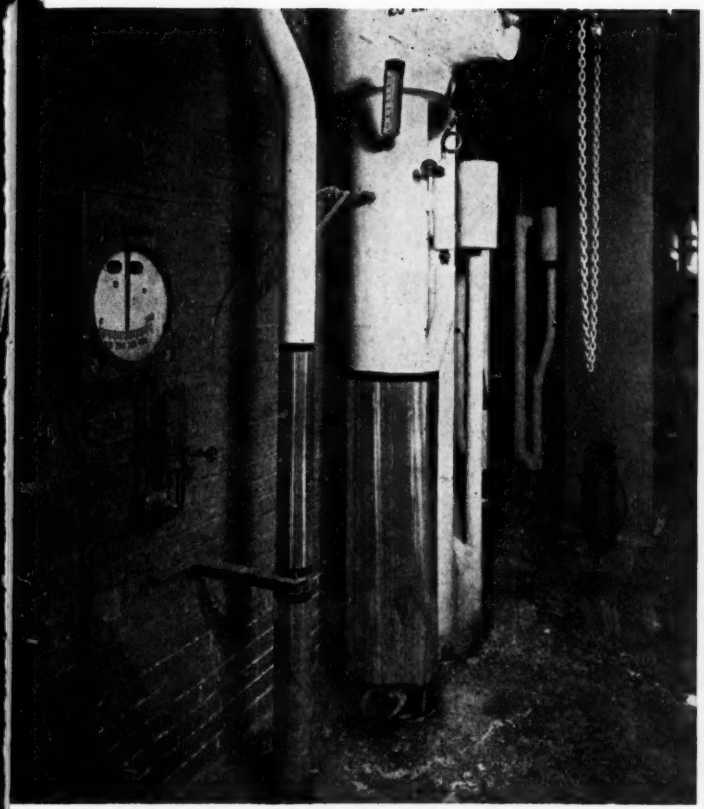
City _____ *State* _____

the
GIRDLER
Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

LOUISVILLE 1, KENTUCKY

VOTATOR DIVISION: New York, Atlanta, Chicago, San Francisco



PROBLEM: High maintenance cost of canvas jacketing. High-pressure hot water hose used to clean floor damaged lower ends of lines and necessitated constant replacement.

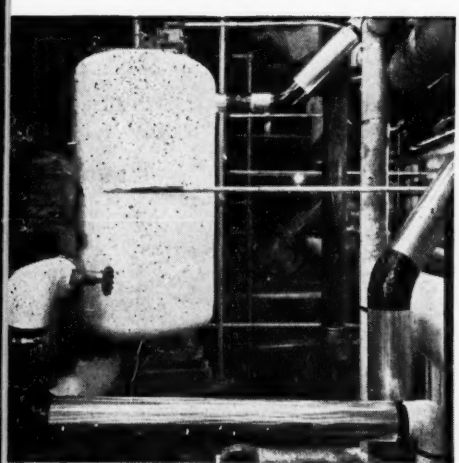
SOLUTION: Childers Aluminum Jacketing replaced canvas. Waterproof—easy to install—reusable.

PROBLEM: Extreme hazard of fire from static electricity generated in machinery. Canvas jacketing could burn easily causing danger to men and machinery in plant.

SOLUTION: Childers Aluminum Jacketing installed. Fireproof—easily cleaned of oil to reduce fire hazard.

Do Insulated Lines in Your Plant Cause These Three Common Problems and Hazards?

Read How Special Aluminum Jacketing Solved Them for Scott Paper Company



PROBLEM: Costly replacement of insulated lines damaged by oil drippage and bumping by men and tools.

SOLUTION: Maintenance engineers replaced canvas jacketing with Childers Aluminum Jacketing. Easy to wipe clean . . . durable and resistant to abrasion and abuse. Maintenance cost reduced.

The Scott Paper Company, Chester, Pa., and nearly 1,000 other modern plants in this country have protected insulated lines with Childers Aluminum Jacketing.

Childers Aluminum Jacketing cuts maintenance costs. It needs no upkeep . . . retains its protective value for years. Because Childers Aluminum Jacketing needs no painting, it can actually pay for itself in this saving alone. And of course, this modern aluminum jacketing can be removed and replaced easily for line repairs.

Easy installation cuts cost even farther. Only tools needed are pliers and wedge. Economical strapping holds jacketing securely—allows easy removal.

Try this low-cost protection in your plant. Write today for engineering data and information about how you can order a 400 sq. ft. roll to test on one of your insulated lines. No obligation. For full details write to: Childers Manufacturing Company, Department FE-7, 3620 West 11th Street, Houston 8, Texas.

SPECIFICATIONS

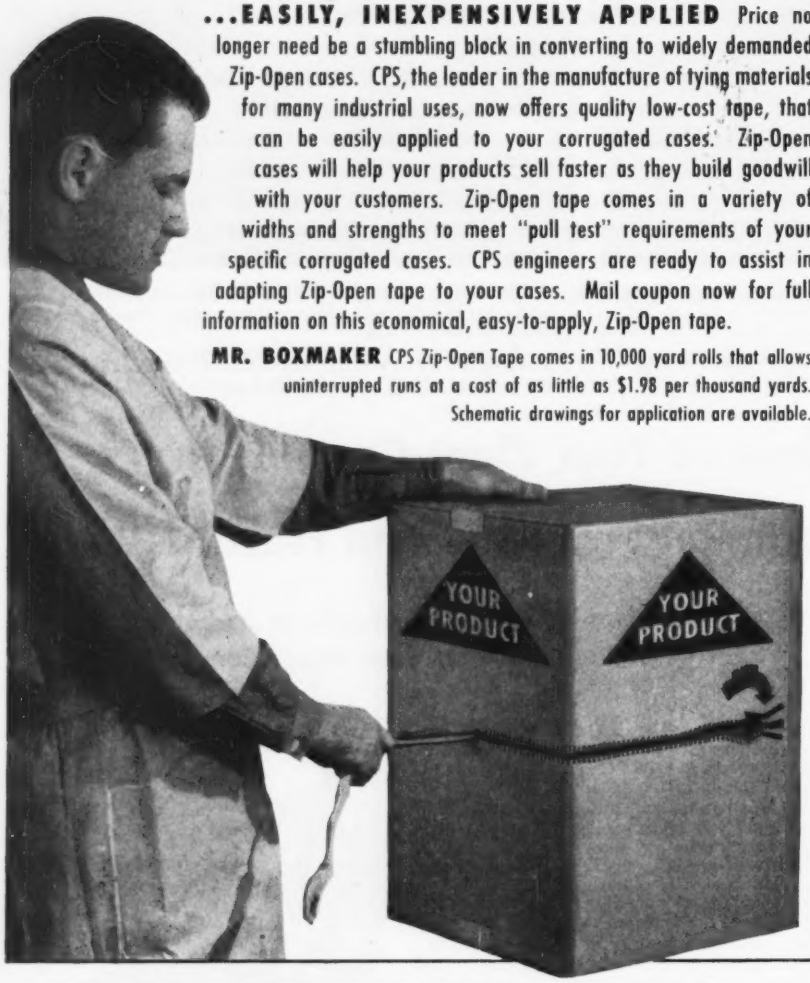
Childers Light-Weight Aluminum Jacketing

Shipped in rolls. 4 ft. wide; 100 ft. long with or without moisture barrier. Aluminum of .006" thickness. Cut with straight edge and dull knife. Write now for full details and engineering data.

LOW COST Childers Aluminum Jacketing answers many problems in plants all over the country. It's light weight, easy to install—goes on with simple bands. Weather, water, heat and fire resistant—can be used and re-used for years.

(Advertisement)

Now... LOW COST CPS ZIP-OPEN TAPE for your corrugated cases...



...EASILY, INEXPENSIVELY APPLIED Price no longer need be a stumbling block in converting to widely demanded Zip-Open cases. CPS, the leader in the manufacture of tying materials for many industrial uses, now offers quality low-cost tape, that can be easily applied to your corrugated cases. Zip-Open cases will help your products sell faster as they build goodwill with your customers. Zip-Open tape comes in a variety of widths and strengths to meet "pull test" requirements of your specific corrugated cases. CPS engineers are ready to assist in adapting Zip-Open tape to your cases. Mail coupon now for full information on this economical, easy-to-apply, Zip-Open tape.

MR. BOXMAKER CPS Zip-Open Tape comes in 10,000 yard rolls that allows uninterrupted runs at a cost of as little as $1.98 per thousand yards. Schematic drawings for application are available.

YOUR PRODUCTS Packed in Zip-Open Cases enjoy these BIG SALES ADVANTAGES

SAFE... NO DAMAGE TO YOUR PRODUCTS
No more cut fingers with Zip-Open Cases. No more costly damage when careless knives slit or puncture your products.

SAVES RETAILERS TIME
Zip-Open cases save 1/3 the retailers time over regular cases.

EASY TO MARK
Retailers appreciate the manhours they save because of easier pricing of products.

EASY TO REMOVE
Shelf stocking of your items is one third faster with Zip-Open cases.

CASES BECOME CARRY-OUTS
Neat Zip-Open cases are easy to use as customer-order-cases.

HOME SHIPMENTS
Make an instant hit when Mrs Consumer finds you've made it simple for her to open your cases.

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Gentlemen: We are interested in your Zip-Open Tape and would appreciate more information.

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Our Box Maker is
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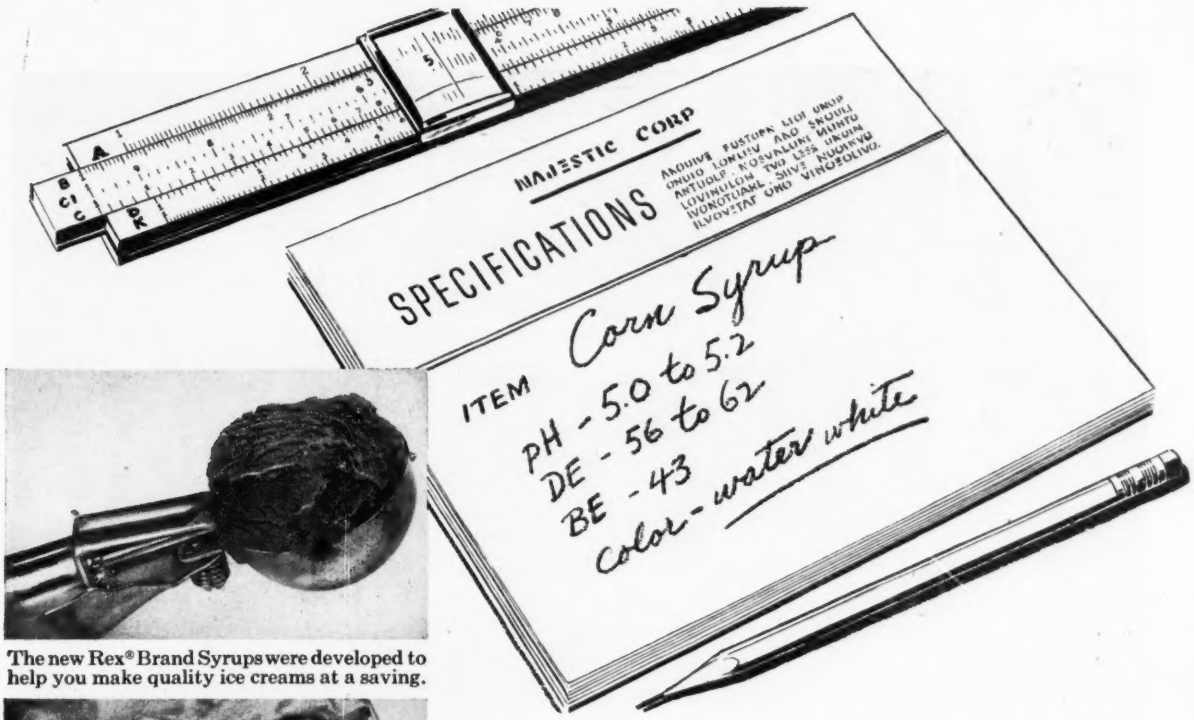

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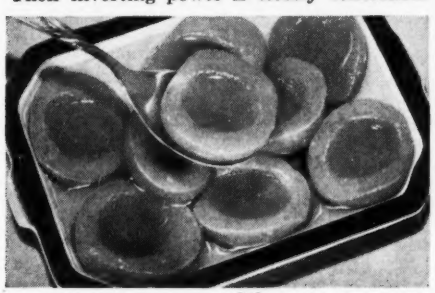

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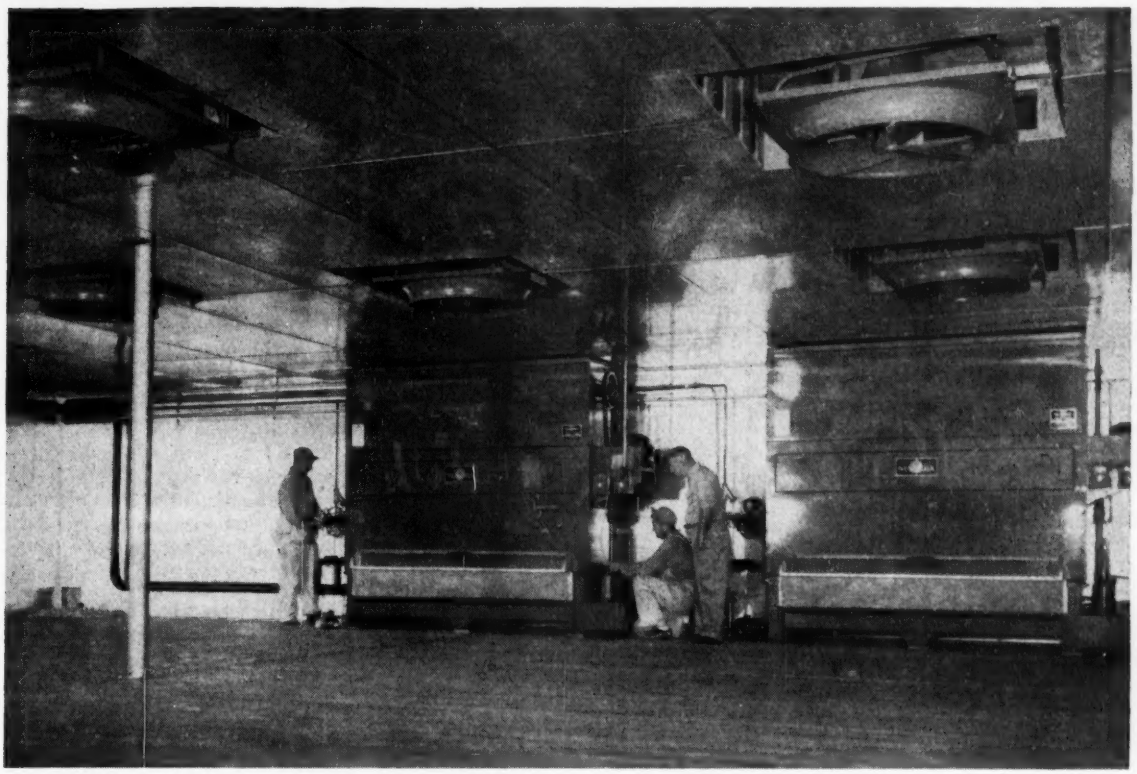


IN FREEZING ROOM, unit coolers discharge cold air into ceiling plenum chamber. Booster fans in ceiling whip cold air about product. Floor in room is hardwood; ceiling and walls have aluminum facing bonded on plywood.

New Quick-Freeze Bread Plant Incorporates

ADVANCES IN REFRIGERATION

Pioneering baker employs latest equipment, materials and techniques in unique operation. Freezing solves distribution and work problems

FE STAFF

If advanced engineering is any criterion of success, then the new bread freezing and storage plant is a sure bet for Arnold Bakers, Inc., Port Chester, N. Y.

Here, operating efficiency is keyed to centralized refrigeration control wherein automatic thermostats call upon equipment units only as the load demands—both for quick freezing and storage. Further, the freezing equipment employed permits continuous production, stops for defrosting being unnecessary.

Through this freezing plant, the first designed specifically for bread, the company not only retains maximum product quality but also provides more efficient distribution in its distant markets. Freezing will permit delivery to those parts of the country where premium breads are not generally available to consumers.

In the long run, this method of handling bread is envisioned as a means of leveling the work load. Thus bakers can work a normal 5-day week, and the Monday-morning demand can be met without abnormal expenditures. Control of supply in this manner also will minimize returns, thus easing another of the baker's costly headaches.

Cuts Cost in Half

Previously, the company had been using public facilities in another city for freezing and storing its frozen products. With the new plant, Arnold is able to freeze bread at the peak of its freshness and at the same time halve its refrigeration costs, previously estimated at 1c. per pound. Then too, a full line of goods can be stockpiled right at the bakery to permit

faster service to distributors, especially where demands fluctuate widely.

The new facilities, installed in an existing steel-frame, masonry-exterior structure, are comprised of the following areas: (1) A cold box area having three rooms—freezing, packing, and storing; (2) compressor room; (3) office space, and (4) and interior truck and receiving bay.

Built at a cost of $110,000, the new plant covers nearly 9,000 sq. ft. and provides 12,000 cu. ft. of refrigerated storage space—exclusive of the freezing and packing areas.

Sequence of processing operations is as follows: After normal cooling and wrapping—within 4 to 6 hr. after leaving the oven—the individual loaves are placed on racks. Then the racks are wheeled into the freezing room, where they are frozen at a temperature of −15 to −20 deg. F. in about 6 hr. From the freezer, the bread goes to the adjoining packing room, and the loaves are put into cartons before being transferred to the storage room.

The bread is stored at 0 deg. F. until shipped in refrigerated trucks to distributors in cities beyond a 400-mile radius of the plant.

Construction Detailed

The entire cold box is enclosed by insulated walls, ceiling, and floor. It is made of prefabricated sections of plywood with a bonded aluminum facing and with fiber glass insulation between the inner and outer walls. Wall sections are approximately 8 in. thick, these sections being erected at the site to form the box. The entire area rests on a wood deck mounted on piers over the existing plant floor. This construction permits air circulation beneath the box.

The freeze room is approximately 40-ft. square and 10 ft. high. It has a hardwood floor over fiber glass insulation, and its hung ceiling creates an overhead plenum chamber.

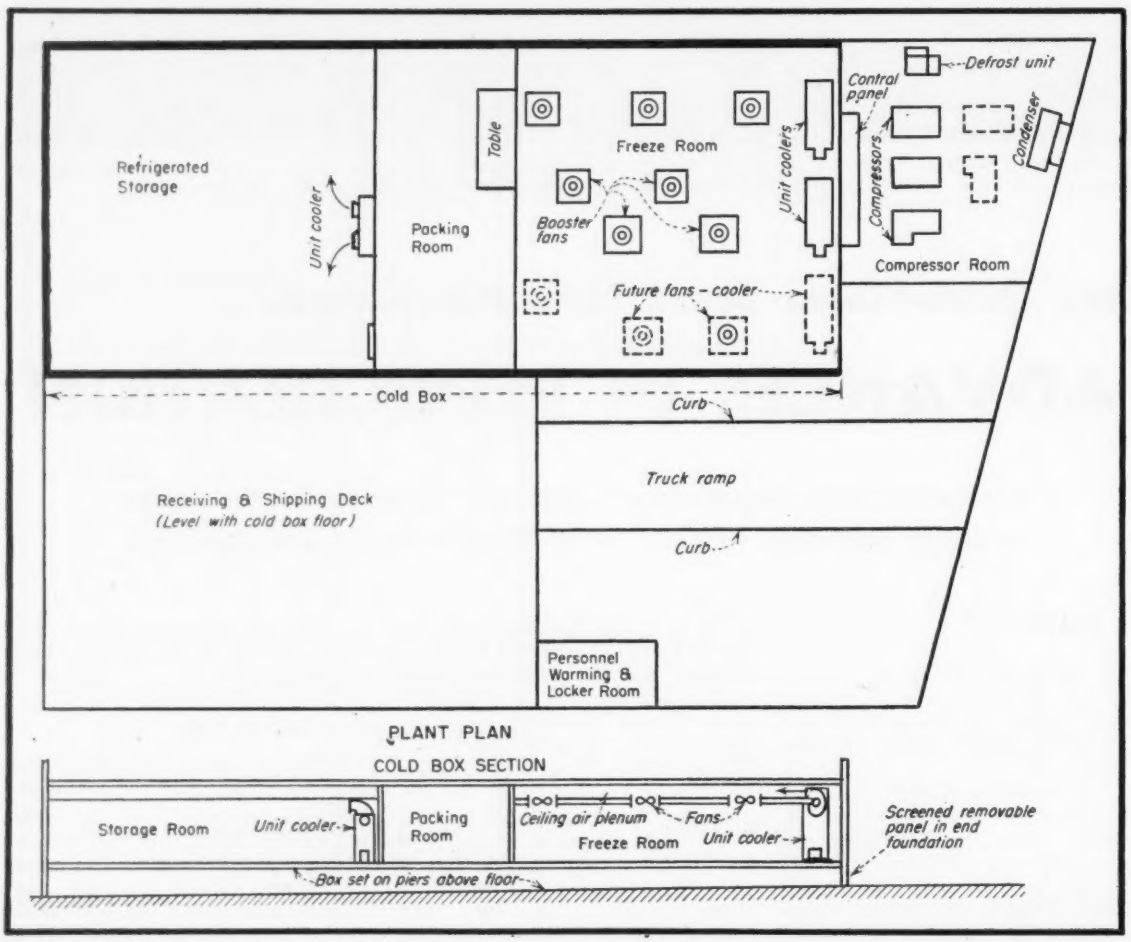
Two finned-coil spray unit coolers, (Niagara Blower Co.), each equipped with an air-circulating fan and spray pump, are employed in the freeze room. Provision has been made for a third unit. Each unit cooler has a capacity of 7 tons of refrigeration and the normal air circulation is 11,000 cfm. per unit.

Uses Booster Fans

Coolers discharge into the plenum, which is equipped with seven ¾-hp. fans. These booster fans whip the air around the room to expedite freezing of the bread. They are manually controlled and have a capacity of 11,000 cfm. each. Provision has been made for installing additional fans when increased capacity is required.

"No-Frost" liquid is used as a spray solution in the unit coolers, and the regenerative equipment is located outside the freeze room, in the adjacent compressor room. Use of spray units in the freeze room eliminates shutdown for defrosting and permit continuous production.

Freezing capacity of this room is 1,000 lb. of bread per hour at an average temperature of −15 to −20 deg.



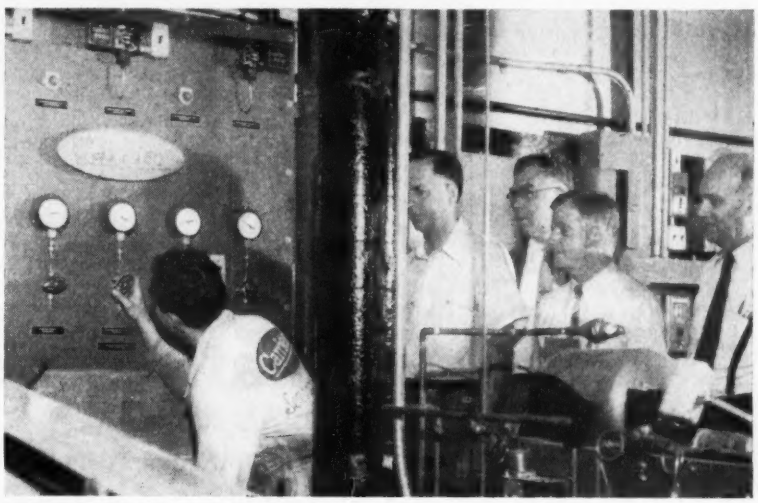
PLANT LAYOUT shows location of rooms and equipment. Section reveals how cold box is carried on piers above plant floor to permit ventilation and access to piping. Receiving deck is at same level as cold box floor for easy handling.

F. Two thermostats, with a range of −50 to +20 deg. F., control the operation of the compressors. A third thermostat, set at 0 deg. F., operates a warning light on the main control panel in the compressor room.

The cold storage room also is 40 ft. square and 10 ft. high, and has a hardwood floor over fiber glass insulation. This room is chilled with a finned-coil, spray-type unit cooler equipped with an air circulating fan and spray pump.

The spray solution used in this cooler is the same as in the freeze room units. The cooler's refrigeration capacity is 4 tons, and its normal air circulation is 3,750 cfm., through two directional outlets at ceiling height. There are two thermostat controls in this room. One, with a range, −20 to + 50 deg. F., regulates compressor operation. The second, set at 10 deg. F., operates a warning light on the main control panel in the compressor room.

FROZEN BREAD is packed into cartons prior to storage. Concrete floor in this room contains heated pipe grids for employee comfort.



SERVICE MAN at control board checks pressure settings on compressors. Trouble lights on board apprise operator of any abnormal conditions.

Floor Heated

The packing room, which measures 15x15x10 ft., has a concrete floor slab over fiber glass insulation. Incorporated in this concrete wearing-surface slab for employee comfort are four heating coils. These coils are comprised of ¾-in. pipe spaced on 12-in. centers, and fuel oil is circulated through them as a heat-exchange medium.

This oil is steam heated by an exchanger equipped with a thermal regulating valve to control the temperature at 70 deg. F. A gear-type pump circulates the oil through the coils at a minimum rate of 12 gpm.

Openings have been provided in the walls of the packing room to permit transfer of products via conveyors from freeze room and into the storage room.

Heart of the plant is the 25x30-ft. compressor room. In this room is located the central control panelboard from which all operations are automatically regulated. The board is also equipped with tell-tale lights which apprise the operator of any off-normal conditions in the freezing or cold storage rooms.

The equipment now installed in this room consists of three compressors, an evaporative condenser, and a concentrator assembly. Space is provided for additional refrigeration capacity.

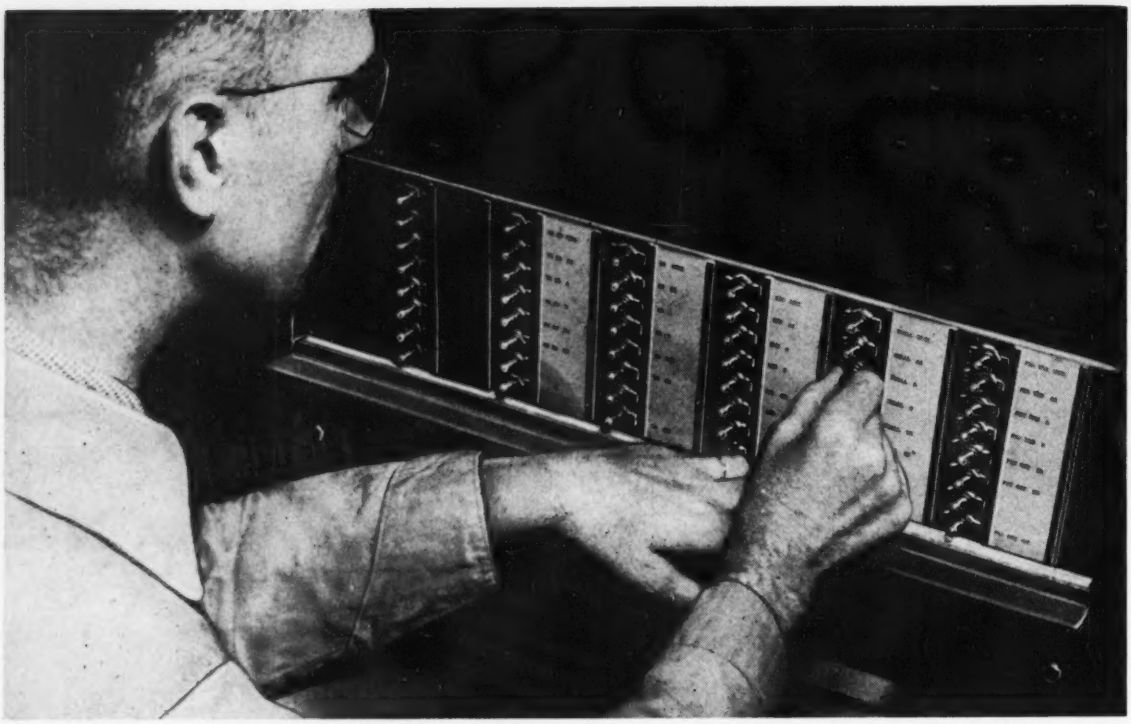
Two-Stage Refrigeration

Two compressors carry the deep freeze load in stages. The first is a 30-hp. rotary unit (Fuller Co.) with 206-cfm. displacement. It uses Freon 12 refrigerant and operates at −5.5-in. vacuum to 37 in. psi. discharge. The second stage is a 25-hp. multi-cylinder reciprocating unit (Carrier Corp.) with 73-cfm. displacement, using Freon 12 refrigerant. It operates at 37-psi. suction and 125-psi. discharge.

A third compressor, is a multi-cylinder reciprocating unit (Carrier Corp.) equipped with a 10-hp. motor, carries the storage-room load. The condenser (Carrier) has two circuits—18.7 tons of capacity for quick freezing room and 5.1 tons for the storage room. Air inlet and outlet ducts are provided for circulation of outside air. Equipment includes fan and circulating pump and automatic by-pass dampers for recirculation.

The concentrator for handling the "No-Frost" solution is complete with spray pump, filter box, heating coil, and fan. Moisture removal capacity is 15 gph. The sump tank for the spray solution is 30x30x36 in. Supply and feed pumps operate in conjunction with the concentrator. A heat exchanger controls the temperature of the spray solution.

Space heating and other steam requirements are handled by a gas-fired boiler rated at 280,000 Btu. per hr. Steam demands include: (1) Unit heaters for the office and compressor rooms—both under thermostatic control; (2) radiator for the wash room; (3) heat exchanger—under thermostatic valve control—for heating the oil used in the floor coils in the packing room; and (4) a steam coil for the concentrator—with solenoid valve control.



MEMORY UNIT controls operations. It receives electric impulses telling it quality-grade and weight of each egg, also which conveyor cup is carrying it. The "brain" then controls shell protection and drops eggs in proper cartons.

Memory Unit Controls Operations In Automatic Food Plant

Remembers quality and weight of eggs, "decides" which are to be shell-protected, puts each into proper carton. Other automatic devices used

IF YOU THINK anyone has been kidding about the robotizing of food plant operations, here's one to ponder about. And if you have ideas and plans of your own to make things work more automatically, here is a system incorporating several tools of control engineering that may be useful to you.

Among these tools is an electronic memory system that knows the quality-grade and weight of each egg and which conveyor cup is carrying it. With this knowledge, the "brain" protectively coats certain eggs, but not others. And it drops each egg into the right carton, according to its grade and weight.

But that's not all. The control engineers applied automatic indexing to conveyor feeders, synchronized a transfer wheel with a conveyor, built automatic tallying and totalizing into the line, and arranged for automatic movement of cartons as they are filled row by row.

As a final ingenious touch, the quality control boys came up with the idea of automatically coding the eggs in invisible ink that shows up only in "black" light.

All these time-cutting, labor-saving, and quality-im-

CANDLED eggs are placed according to grade, on eight shuffle feeders in front of candler. They then move to elevator, at left, which takes them to a weighing scale.

GENERAL view of one egg candling line. Incoming cases of eggs are placed on roller conveyors which supply candlers. Six cases can be placed on each conveyor, providing a work backlog for the candler.

proving ideas are incorporated in electro-mechanical egg candling, coating, and packaging machinery designed by the Packaging Equipment Division of Food Machinery & Chemical Corp., Riverside, Calif., in cooperation with Poultry Producers of Central California.

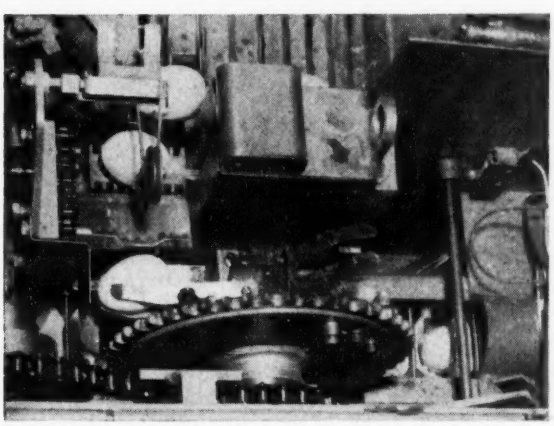
The first installation of this development in robotizing has been made in the Modesto, Calif., plant of Poultry Producers, and is described and illustrated here. Incidentally, the poultry company plans further installations to take advantage of this most advanced of egg-handling equipment.

Use of this equipment relieves the candler of several tasks, enabling her to make quality-selections with greater speed. There are six candling stations on each unit (two units are in operation at PPCC, Modesto). Cases of eggs are delivered to candlers by gravity conveyor. At each candling station, conveniently located immediately in front of each candler, is a receiving rack composed of eight separate lines or shelves. Each line, in reality a shuffle feeder, corresponds to one of the quality separations being made.

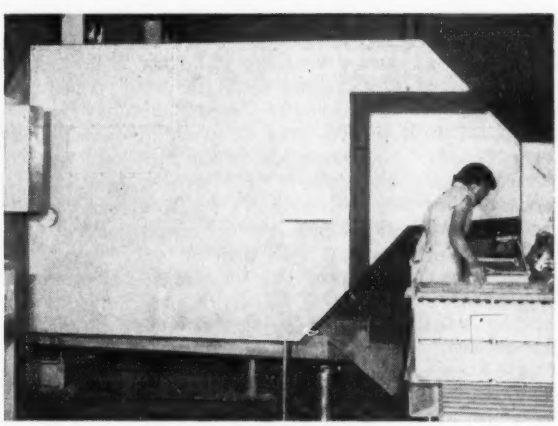
How It Works

Eight separations are possible. PPCC is making seven: AA, A White, A Brown, Checks, B, Heavy Dirty, and Light Bloods. Eggs are candled for inferior quality and exterior appearance only (the machine does the sizing).

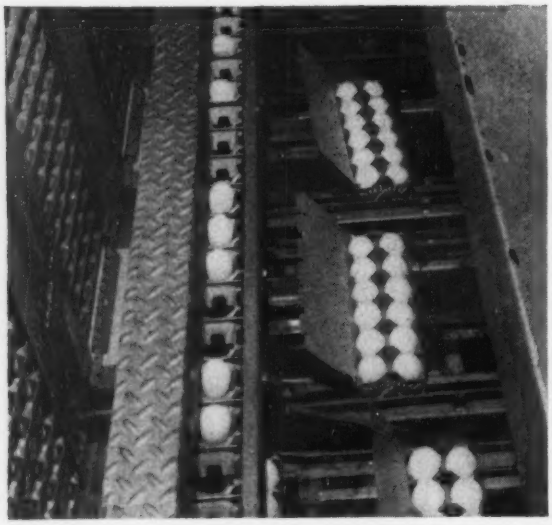
The candler places the egg on the proper shuffle feeder, then the machine takes over, and the balance of the opera-



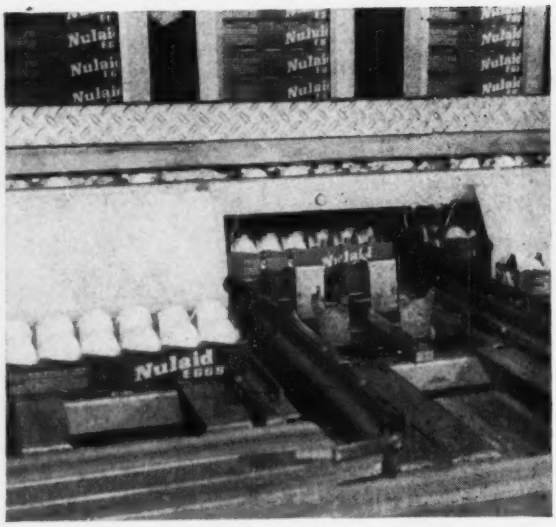
FROM weighing scale, eggs move into a feeder wheel that places them on a horizontal conveyor for transfer through shell-protector to packaging area.



BETWEEN candling and packaging areas is this oiler which applies protective solution to shells of eggs, if directed to do so by electronic memory system.

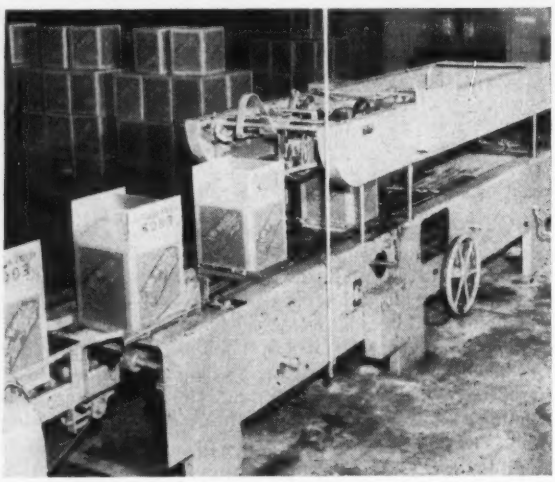


TRIP-CUPS on conveyor carry eggs to carton filling operation. Switch opens cup and drops egg gently into carton or tray, as directed by memory system.



CARTONS under the egg conveyor are moved row by row, at proper moment, by memory system, which also discharges each carton when full.

FILLED cartons from packaging lines are conveyed to one packing table, where girl puts them into shipping cases.



SHIPPING cases move by automatic take-away conveyors to automatic closer and sealer. Top and bottom are sealed; cases are code dated.

tion is entirely automatic. The shuffle feeders index once a second, transferring the eggs to the vertical elevator.

When the eggs reach the top of the vertical elevator, which is only a few inches above the candler's rack, they are transferred onto a weighing scale that is accurate to a tolerance of 1g. Transfer from the scale is made immediately into a feeder wheel whose movement is synchronized with a horizontal conveyor that carries the eggs through a shell-protector to the packaging area. As each egg leaves the scale, it passes over a counter switch and is tallied into the producer's lot by size and quality. And almost simultaneously, the egg passes under a marking wheel that codes it with invisible ink.

Each candling station has its own identifying code. Black-light inspection of the egg makes the code-mark visible, thereby identifying the candling station that handled the egg.

After each producer's lot has been completed, the candler places a producer-identified printed ticket in a printing counter, presses a button, and the count of eggs by grade is automatically totaled and printed. Resetting the counter is instantaneous with the pull of a handle.

Before tracing the progress of the egg to the packaging area, one more important feature of this unit should be explained—the "memory system." This might well be called the nerve center of the unit. It is here that electrical impulses are received and retained to control the handling of each egg.

Memory System

The first impulse is received the moment the egg leaves the shuffle feeder. From that point on, the system "remembers" the quality of that particular egg as designated by the candler. As soon as the egg is weighed, the second impulse is received and retained, and from then on, the memory system knows two things about the egg—the quality-grade and the weight.

And as the egg is transferred to the conveyor that will carry it to the packaging area, the memory device also notes which conveyor cup is carrying the egg, and it retains that information for future use.

Six separate weight separations can be made automatically. PPCC sorts Jumbo, Extra Large, Large, Me-

CARTONS and filler-flats are placed in supply chutes and holders feeding both packaging lines. One girl does it.

dium, Small, and Pewee eggs. The six sizes and eight quality-grades make a total of 48 separate classifications that can be handled by this machine.

Since eggs candled at the six stations are all transferred to a single conveyor, this one conveyor must travel six times faster than the vertical elevators feeding it. An empty conveyor cup thus is provided for each candling station at every transfer.

The feeder wheel takes the egg from the scale and accelerates its travel so that it reaches the speed of the single conveyor, six eggs a second, and the transfer can easily be made—always into an empty conveyor cup.

As the eggs are conveyed to the packaging area, they pass through the shell-protector, where they are treated with safeguarding solution (or go through untreated). It is interesting to note that any of the 48 combinations of eggs can be protected. Since the "memory" knows the size and quality of the egg, any desired number of any of the 48 combinations can be set up through simple selector switch settings, and those selected eggs then will be shell-protected, without extra handling.

The protective solution cascades over the egg from seven jets mounted in an arc at right angles to the conveyor line. Jets are in action for approximately 1/12 second as the egg passes under the arc. As it continues through the shell-protector, compressed air removes the excess solution. This solution is recovered, purified, and reused by the unit.

A separate counting system, located on the shell-protector, shows in hours and tenths of hours the time each candling station has run, as well as the total number of hours the unit has been in operation. Another set of counters in the same cabinet indicates the daily total eggs inspected by each candler, while still another counter records the total number of eggs that have been shell-protected—all important for careful checking of output and inventorying.

The packaging area has twelve egg-tray packaging stations and six dozen-size carton packaging stations. One attendant easily keeps the egg tray magazines and the dozen-size carton chutes filled with an ample reserve supply ready for packaging.

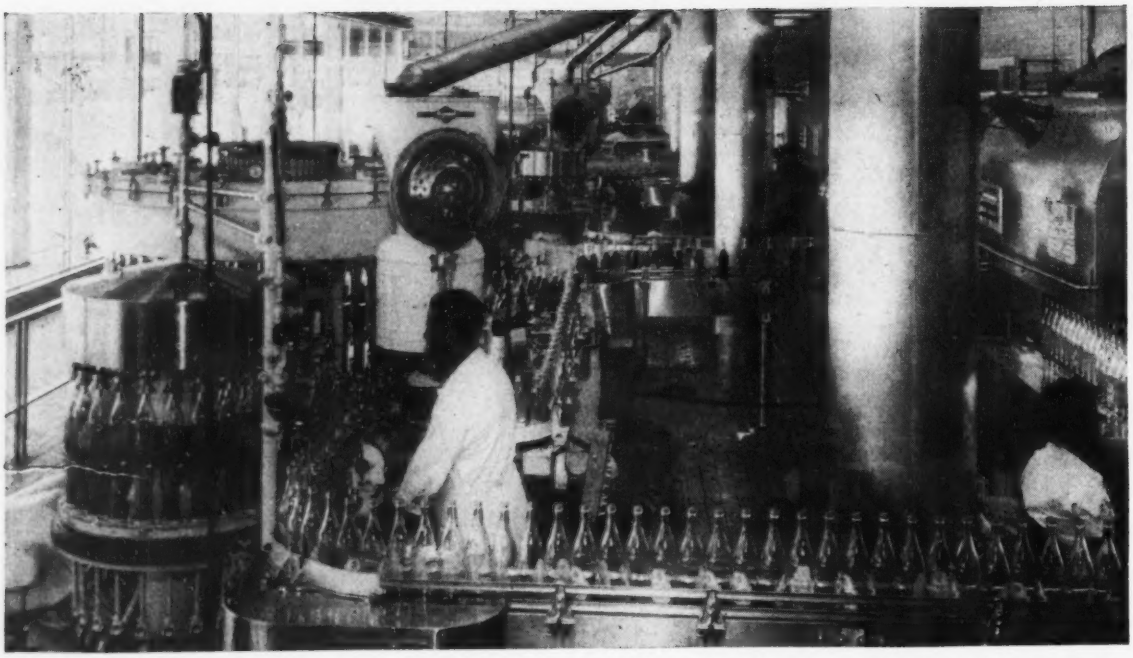
Packaging Operations

The memory system is set up to know in which station each of the 48 combinations of quality and size is being packed. When an egg reaches its appropriate station, a selector switch automatically opens the conveyor cup and the egg is rapidly but gently deposited in its proper place in the carton or egg tray. The "memory" then moves the package, row by row, at the exact moment, discharging it when full, and replacing a new package promptly, without delaying the delivery conveyor!

One packaging station attendant on each machine places egg trays into cases or half-cases. Cartons are moved automatically to take-away conveyors, through an automatic carton-closer and code-dater to a station where they are placed into cases. Filled cases move by automatic take-away conveyors to an automatic closer and sealer that seals both the top and bottom of the cases and codes them with the date of packing.

"Electric eyes" (photo-electric cells) separate half-cases from 30-dozen wooden cases as they move down the lines, diverting them to their respective positions. These "eyes" also delay cases moving in from the different lines to prevent their colliding as they move past the intersections.

Another important feature of the unit is that it provides uninterrupted conversion in packaging into trays or dozen cartons of any size or quality combination being filled. Changes can be made in the memory system at any time, without stopping the unit. Due to the ease of training candlers on this new equipment, PPCC at Modesto already is averaging a total of 216,000 eggs per shift on their two line unit.



FILLING ROOM is separated from remainder of plant by glazed tile walls and glass partitions. Washers are set in wall so they can be loaded with returned bottles in shipping department and discharge clean ones in filling room (right). After inspection, bottles are filled, crowned, mixed, then conveyed back to shipping room for casing.

Automatic Signals and Controls *Robotize* Soft-Drink Process

In Vernor's new Detroit ginger ale plant operator "pushbuttons" all syrup-making steps . . . Unique system provides sterile water . . . CIP setup makes cleaning easy

Second of Two Articles

J. N. SUTTON and ARTHUR V. GEMMILL

Respectively, Production and Traffic Superintendent, James Vernor Co.; and Senior Associate Editor, "Food Engineering"

Automatic processing plays an enormously important part in the new $5,000,000 bottling plant of James Vernor Co., Detroit.

In the bottling and casing operations it has enabled reduction in number of handlings of cases of empty bottles from a previous six times to one, and greatly cut down the time required to load and unload delivery and transport vehicles—as recounted in our initial article, "Plant That's 'Long' on Engineering 'Show-Cases' Its Process," FE Aug., p. 65.

In the syrup-making department, automatic signals and control devices, mounted on a large control panel, dominate the operations.

They prevent spillage losses, insure maximum uniformity of syrup, and minimize supervision.

Syrup for use in bottling and fountain departments is prepared by a hot process. In other words it is pasteurized by boiling for 5 min. and then cooled to 40 deg. F.

The syrup-making system is fully automatic and pushbutton controlled, except for addition of sugar. This is received in 100-lb. bags and, to prevent possible errors, it is palletized, 15 bags to a pallet (correct amount for making up a 300-gal. batch of syrup).

System comprises the following equipment: Four 300-gal. cookers, one 2,000-gph. hot syrup pump, one HTST pasteurizer utilized as a heat interchanger and pre-cooler, one 2,000-gph. cold syrup pump, six 300-gal. coolers, four 1,000-gal. storage tanks, one Moyno syrup pump, and three 20-ton Freon refrigeration compressors.

Treated, sterilized water for syrup making is pumped from treating department through first section of heat exchanger (where it is used to cool pasteurized syrup) and to a 600-gal hot water storage tank.

How of Syrup Making

On a central panel in the special glassed-in control room, are mounted controls for each vessel, with indicating lights that tell the stage of processing in each. (See photo opposite p.)

To make a 300-gal. batch of syrup, operator inspects section of panel representing cooker he desires to use. If

empty, there will be a green light showing, and a white light indicating that inlet valves to cooker are shut.

He then presses button marked "In," causing automatic inlet valve to open and allowing filtered, pre-heated water from the 600-gal. tank to enter the cooker. When water reaches liquid-level electrode in tank, inlet valve is automatically closed, tank agitator is started, and valve in steam line to jacket opens. Light on panel indicates when steam valve is open.

Operator then turns the "Sugar In" switch, which notifies a helper in the cooker room to add 1,500 lb. of sugar. When the last of the sugar is added, a "Full" light appears on panel. When batch comes to a boil, an automatic timer cuts in to keep the syrup boiling for 5 min., after which time the agitator stops, steam valve closes, and indicating lights go off. At the same time a red light signals that the batch is ready to be cooled.

Cooling the Syrup

To select a cooler for the batch, operator checks cooler panel section for a green light, which indicates an empty tank. Then he presses the "In" button on section for cooler selected, causing automatic opening of the inlet valve. "Out" button of cooker is then pressed to open outlet. (This valve will not open unless "Ready" light shows on panel.)

Once above valves are open, filtered water inlet on heat exchanger will open, permitting water to pass through first section of unit. Inlet valves to 2nd and 3rd sections of heat exchanger also open allowing, respectively, cooling tower, and refrigerated water from the Carrier unit to flow through. At the same time hot syrup pump starts, and refrigeration valve on cooler tank jacket opens. These steps are all performed automatically through a series of relays.

When cooker is empty, outlet valve will close, as will also water inlet valves to heat exchanger. And syrup pump will stop. Remaining syrup in lines and exchanger is flushed over to cooler by make-up water. Once complete batch is pumped over, extract is added by pressing a panel button that controls outlet of extract measuring device. Measuring device is automatically kept filled from extract department.

Finally, "Water In" button on cooler panel is pressed, allowing make-up water to flow in and bring batch to 300 gal. Water inlet valve closes automatically when syrup level reaches "full" electrodes in cooler. These also cause tank agitator to start.

When temperature of syrup reaches 40 deg., agitator stops, refrigeration valves close, and blue light shows on cooler panel, indicating the batch is ready for use.

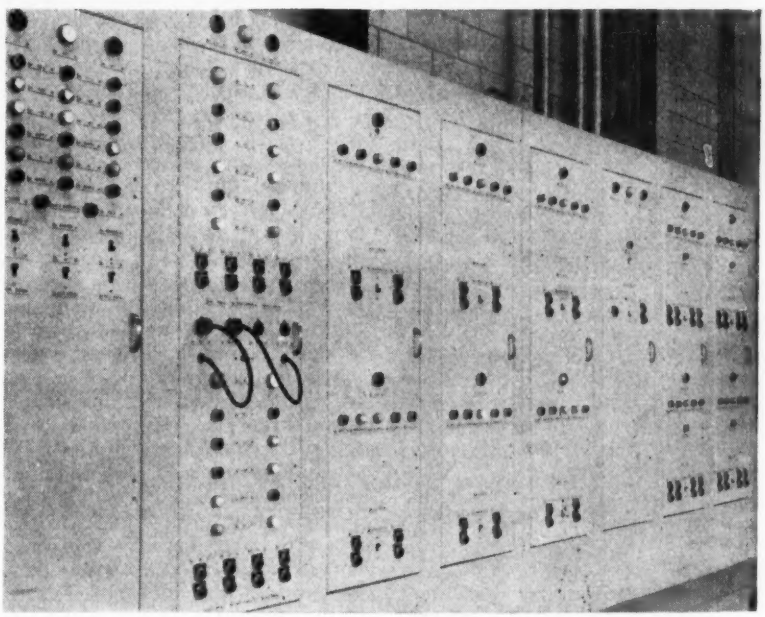
Operator now selects one of the 1,000-gal. storage tanks by observing lights on control panel that tell him how full each tank is and which one is being drawn from. Since unsettled syrup contains entrapped air that may cause trouble at filling machines, it is unwise to add syrup to a tank being emptied. For this reason the system is so arranged that inlet valve of a storage tank will not open if outlet valve isn't closed.

Once a storage tank is selected, "Out" button on cooler panel is pressed, opening outlet valve on the cooler. Then "In" valve on selected storage tank is pressed, opening its inlet valve. When both are open, cold syrup pump starts. As soon as cooler is empty, the above-mentioned valves close automatically, pump stops, and necessary indicating lights go on.

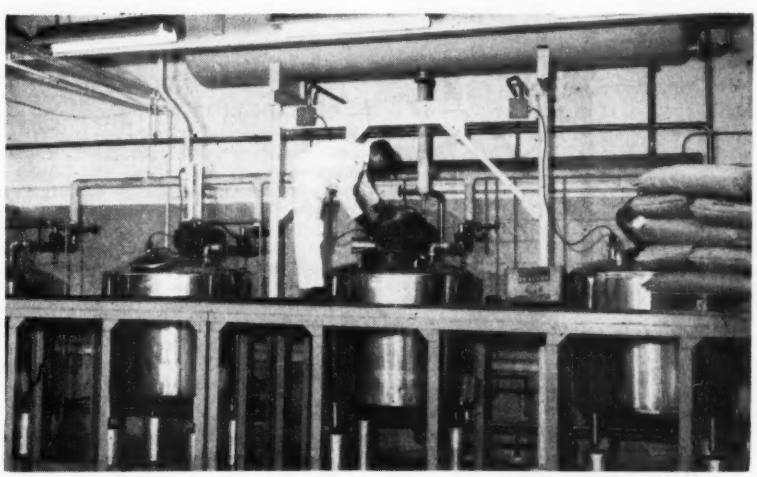
The four bottling lines are fed from storage tanks by a Moyno variable-speed, sanitary pump. This pump was chosen because it does not churn the syrup. Lines at discharge of pump are equipped with by-passes that open when pressure builds up returning syrup to pump inlet.

Storage tank panel has "Out" buttons that control outlet valves of stor-

The "HOW" of Robotized Syrup-Making



"BRAIN" of syrup preparation is this large panel set in a glass-enclosed room. Here, signalling devices keep operator informed as to every step in the process. And there are full controls enabling him to "master-mind" it.



SYRUP is made, cooled and stored in stainless steel tanks equipped with automatic valves operated from control panel.

DATED oak barrels filled with ginger ale extract are racked in aging cellars for at least four years to develop the mellow flavor of Vernor's beverage.

age tanks. To supply syrup to the plant, button for selected tank is pressed and syrup feed pump switch is thrown. When tank is empty, outlet valve closes automatically.

To prevent bottling lines from running out of syrup, an automatic switch-over from one storage tank to another is provided. This is accomplished by connecting one of the special plugs on the storage panel (two are provided especially for this use) into the receptacle representing the tank.

As first storage tank becomes empty, its outlet valve will close and outlet valve on selected tank opens automatically. Removing the plug shuts outlet valve, but feed pump must be stopped manually.

The Moyno pump also supplies syrup to jug filling room, fountain, and tank filling department.

Although the City of Detroit furnishes a very good drinking water, it is not necessarily satisfactory for production of carbonated beverages. For this reason the water is further treated by Vernor's to insure uniformity and purity the year around.

This is done in a 15,000-gal.-per-hr. processing plant consisting of 12 electro boxes, three 5,000 gal. settling tanks, 6 sand-gravel filters, 6 sand and activated carbon filters, 6 paper polishing filters, and 3 ultra-violet ray sterilizing units.

Electro box construction is of cast iron, with bolted-down flat plate cover. Box and cover are coated with a thick layer of insulating rubber, vulcanized to the metal. Outlet and inlet water connections are made of hard rubber pipe, completely insulating the contents of the box electrically.

Rectangular ¼-in.-thick sheets of Armco iron (low carbon, mildly annealed steel) are neatly spaced by Bakelite supports so that each is suspended in water without touching any other plate or the box. Electrical contacts are made with each plate so that the structure resembles a grid battery with positive and negative poles. An Edison 110v. circuit provides (through converters) a regulated dc. discharge to entire set of plates. Two amperes or less pass through each box.

Exposed sides of each plate act as anodes and cathodes, respectively. The short space between plates is filled with continuously flowing water, which becomes a good conductor and literally shorts across the plates.

In this manner ionization is induced, freeing iron molecules, which attach themselves to hydroxyl ions from the partly dissociated water, forming insoluble ferric hydroxide. This coagulates in sizable particles, which serve as filter aid by including in their masses suspended foreign matter sometimes found in potable drinking water. Bacteria and microscopic plant and marine life also can be removed.

Floc formed in these plates settles out in the 5,000-gal. baffled tanks, from where it is flushed daily.

Entire procedure in electro boxes is accomplished in a closed system of flowing water under pressure, which has obvious advantages over open-tank systems in which chemicals are introduced to make a floc.

From settling tanks, the water flows to sand and gravel filters. They rid it of any floc not previously settled out. Floc that accumulates on top of the sand bed further aids in the filtration. Water then enters the sand-and-activated carbon filters for removal of residual Cl. Following these, it passes through the paper filters that protect against any possible carry-over from previous units.

(Turn to page 256)

Roots, Oils—And Following Through on a Formula

The story of Vernor's ginger ale goes back to Civil War days, when the first James Vernor, a young pharmacist, was running a small drug store at Clifford and Woodward Avenues, Detroit. He had devised a new formula of choice ginger roots and essential oils, but kept searching for an undefinable ingredient that would make his flavor outstanding.

Then came the war—whereupon he stored his flavor in charred wooden casks and joined the armed forces.

When, in 1866, he decided to resume work on his formula, he was surprised to find that nature had supplied the elusive ingredient to his product while it had been aging over the intervening four years.

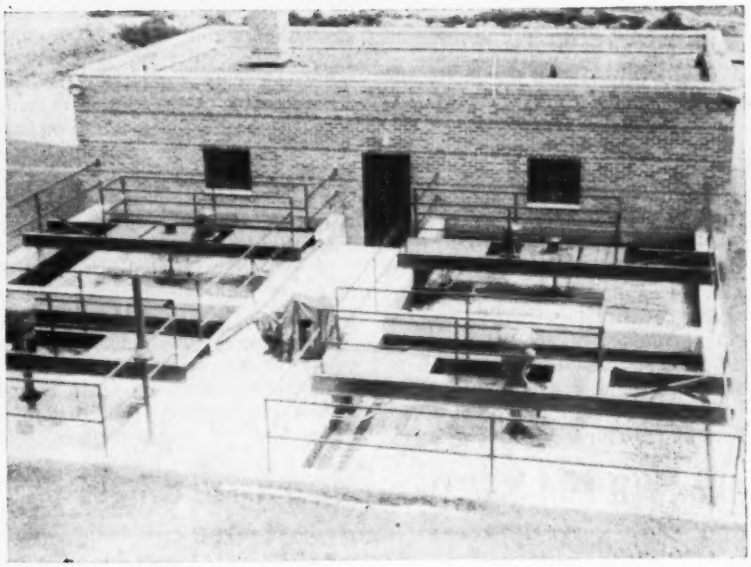
Vernor's has aged it for this same time, or longer, ever since. And company advertising features a jolly gnome as symbol of this process.

Citizens visiting Vernor's drug store quickly "took to" the excellent ginger ale. And as its popularity grew, people began to ask why they couldn't buy it in their local neighborhoods. This demand eventually led to establishment of a small bottling plant and a fountain room near the main boat docks on the Detroit River.

Wagons were assigned to serve retail dealers—transformed, today, into a fleet of more than 350 trucks handling distribution from the main plant and branches.

In 1941, the company began to expand into national distribution. Now there are franchised bottlers in approximately 60 cities in 15 states and Canada.

AUTHOR SCHULZE observes how waste and foam move into funnel-shaped distributor that feeds areator.



PLANT for treatment of milk and cheese wastes at New Holstein, Wis., has four aeration tanks, each equipped with one of the new cavitator rotors. Units are self-contained with motors mounted above drive shaft.

Non-Clogging Foam-Safe Aerators Lick Cheese-Waste Problem

BOD reduced 98% in 14½ hr., air consumption cut 80% by 2-stage system featuring specially designed rotors that intimately mix air with whey

K. L. SCHULZE

Biologist, International Agricultural Products, Inc., Green Bay, Wis.

Low air input with high BOD reduction are characteristics of a most effective dairy-waste treating system now operating in conjunction with several Wisconsin cheese factories.

New system employs a minimum of two aeration tanks. Each is equipped with a specially designed non-clogging rotor suspended just below the discharge of a downdraft tube through which incoming waste is fed.

Nozzles of rotor produce an intimate air-liquid mixture which spreads out toward the tank walls before rising. And flared top of downdraft tube draws foam from surface of waste, thus eliminating this troublesome element.

Wastes a Problem

Dairy wastes and especially cheese wastes are known, not only for being high in BOD, but also for having a very high immediate oxygen demand. This demand may be as high as 1.38 mg. 0_2 per liter per min. For a 3,000 gal. tank this means 15.65g. 0_2 per min. This much oxygen is contained in about 2.2 cu. ft. of air. It is easy enough to blow this quantity of air per min. into the tank, the question is how much of the oxygen actually gets into solution.

Supplying oxygen at such a rate is still one of the major problems in the aerobic treatment of dairy wastes. Another problem is the clogging tendency of porous materials used in air diffusion.

Aerating Rotor

Having dealt with similar problems in the yeast industry in Germany during the war, I set out to develop a mechanical aeration unit that would be highly efficient as to oxygen transfer, non-clogging, and safe against foaming.

The apparatus originally used in our experiments is shown schematically in Fig. 1. It represents a development from similar devices that have been, and are used, in yeast production.

In the center of the round or square tank we have a rotating hollow shaft of about 2 in. outside dia. Fastened to this shaft is the rotor, which consists of a hollow disk with several ½ x ½ in. nozzles at its circumference. Close to, and above the rotor is a downdraft tube with a funnel-shaped distributor, held and centered by tie rods. Upper end of downdraft tube is flared to a funnel-shaped intake port. Level of liquid is maintained constant, its height determined by the effluent pipe.

Cavitation Zone Created

Intake port of downdraft tube is adjustable, so that it can be set somewhat below the liquid level. Raw feed line ends directly above intake funnel. Rotor turns so that openings of nozzles show backward. This is just one of the many types of rotors we are using.

As soon as rotor speed exceeds a certain critical point, air is drawn from the atmosphere through the hollow shaft and dispersed in the liquid. As we visualize the operation, each nozzle creates a zone of cavitation in its turbulent trail and air moves in to fill this area of underpressure.

The moment air leaves the nozzle it undergoes a rapid change of pressure and is finely dispersed by turbulence. At the same time, it is mixed with the incoming raw waste and part of the mixed liquor in the aeration tank. Amount of air entrained depends on size of rotor, its rpm., shape of nozzles, and water depth.

In clear water it can be observed, that the air-liquid mixture spreads like a spiral-shaped milky cloud toward the tank walls and then starts to move upward. When machine is operating, the whole mass of liquid rotates and a considerable part is constantly being pumped down through the downdraft tube, mixed with incoming raw waste and reaerated. Foam also moves constantly toward the center of the rotating surface and is destroyed as it enters the intake funnel.

By providing an oil-filled rotary seal on top of the hollow shaft, we are able to hook up an air meter, such as a Fischer-Porter Flowrator, and get accurate readings of air being drawn in. Experiments on cheese waste started in May 1952 and were continued until September.

Pilot and Full-Size Units, BOD-Time Graphs

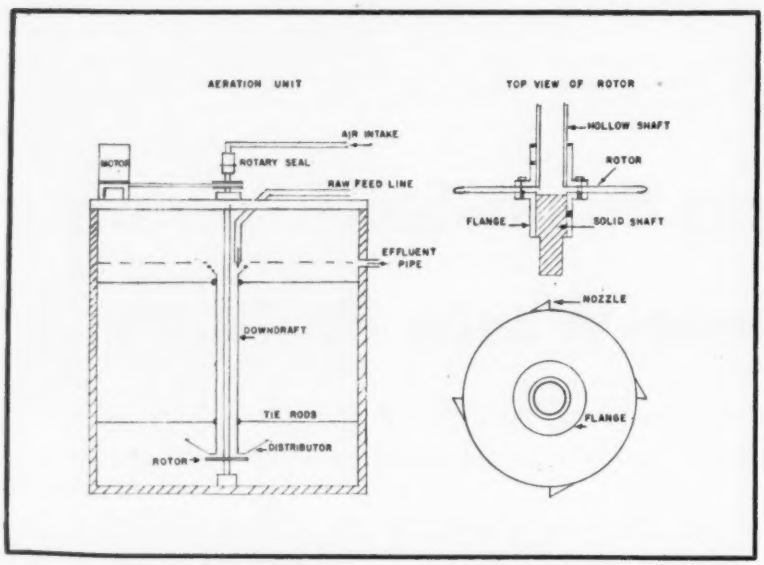


FIG. 1. Experimental aeration apparatus comprised rotating hollow shaft in center of tank. Shaft has nozzled rotor at its base, is enclosed in downdraft tube with funnel-shaped distributor.

In the pilot installation, raw waste flows through a holding tank and is pumped at a constant rate of 1-2.5 gpm. to the aerator, which has a capacity of 950 gal. giving detention periods of 6.3-15.8 hr. Clarifier is rectangular with mechanical sludge removal and two sludge hoppers. It had a capacity of 1,400 gal. and, consequently, was too large for our small feed rates.

Sludge was wasted 2-3 times a day in order to prevent it from getting septic. Rotor was driven by a 3 hp. motor at about 580 rpm. and delivered 11 cfm. of air. BOD and pH determinations were made daily on 24 hr. composite samples.

Detention Time Critical

Raw BOD showed considerable strength and variation, since the cheese factory also had a whey condensing plant. At the beginning of tests, raw BOD varied from 2,500-6,000 ppm., but after some adjustment in the whey plant operations it dropped to 750-2,750 ppm. with a mean value of 1,500.

Results of these tests are shown in Table I and Fig. 2. Values are arranged according to different detention periods in the aerator. From this it can be seen that degree of treatment is dependent upon detention period:

6.3 hr. aeration time gave 57% BOD removal
8 hr. aeration time gave 76 to 79%
15.8 hr. aeration time gave 89%
31.5 hr. aeration time gave 98.6%
45 hr. aeration time gave 99.6%

Proportional Lowering

Apparently this is true regardless of varying BOD load treated per day. The figures show that curve deter-

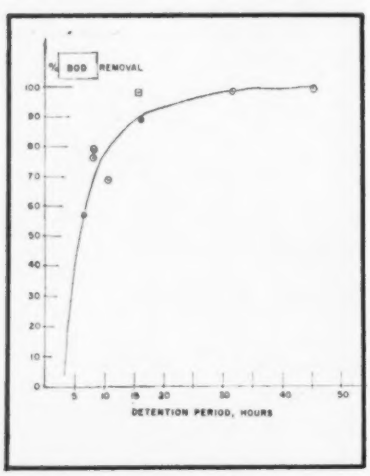


FIG. 2. BOD removal increases with time of retention.

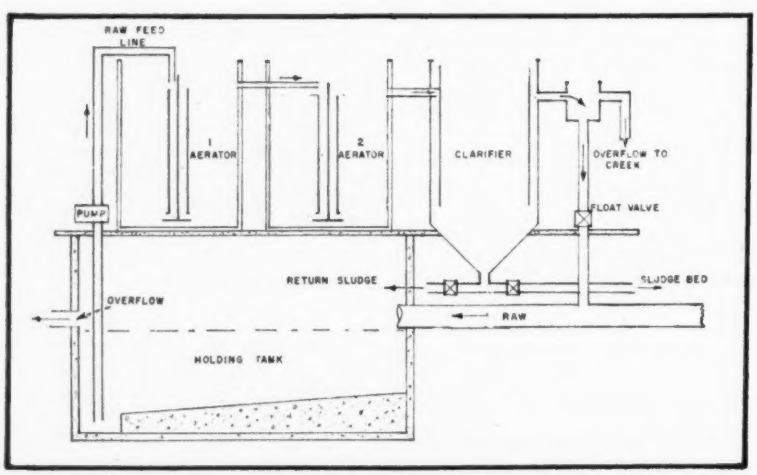


FIG. 3. Schematic of whey disposal plant. Raw waste is pumped from holding tank to 1st aerator, flows by gravity to 2nd, then to clarifier.

mining relationship between detention period and BOD removal is similar to a monomolecular reaction curve. Reaction velocity diminishes proportional to concentration of one reaction partner.

Aeration tank capacity was low, since it provided only 2.5-9.35 cu. ft./lb. of raw BOD per day. The pH showed a marked change, from an average of 5.5 in raw to 8.25 in final, apparently due, for the most part, to assimilation of milk acid.

The question of the amount of air required per pound of raw BOD cannot be answered from these figures. It can only be seen that 545 cu. ft. are sufficient to remove practically all the BOD, provided sufficient detention period is given.

2-Stage Plant Constructed

In order to get more information we decided to build an experimental plant using the same method of aeration, but with two stage treatment, and large enough to take care of total flow of cheese factory plus whey condensing plant. Setup of this plant is shown schematically in Fig. 3.

Raw waste enters an equalizing tank, out of which it is pumped at a constant rate to the first aerator. From there it flows by gravity into downdraft tube of second aerator and on to the round clarifier. Funnel shaped bottom acts as sludge hopper. The sludge either can be returned to aerators by a small pump or wasted to a sand bed. We used the sludge return only for starting unit. Afterward it was wasted once a day.

Effluent from clarifier goes to a sampling box which connects with an overflow line to the creek and a recirculation line containing a float valve. During the day, as long as raw waste comes, this valve is closed. When flow stops at night, level in equalizing tank goes down.

Unit Self Operating

When it reaches a preset mark, float valve opens and final effluent runs into equalizing tank, thereby flushing the bottom of this tank. At the same time we have recirculation through the plant until the waste flow starts again in the morning. Intent is to make unit self operating as far as possible. All the operator has to do is waste sludge once a day.

Equalizing tank has a capacity of 3,000 gal. aerators 3,000 gal. each and clarifier 1,100 gal. Our flow analysis showed that during flush season (about 50,000 lb. milk intake per day) the factory had a minimum flow of 6,608 gal./day and a maximum of 9,375 gal.

Single-Stage vs. Two-Stage Aeration

TABLE I—AEROBIC Cheese Waste Treatment With Single Stage Roto-Aeration, No Sludge Return

Raw BOD Lb./Day	Aeration Tank Capacity Cu. Ft./Lb. BOD	Air Supply Cu. Ft./Lb. BOD	BOD Removal Percent	Detention Period In Aeration Tank Hr.
33	3.8	480	57	6.3
36.6	3.4	430	79	8.0
50	2.5	317	76.3	8.0
18	7.0	880	69	10.5
19.7	6.35	805	89	15.8
13.4	9.35	1180	98.6	31.5
	4.3	545	99.6	45.0

Raw feed rate: 1-2.5 gpm continuously.
Aerator capacity: 127 cu. ft. or 950 gal.
Clarifier capacity: 1,400 gal. mechanical sludge removal.
Air supply: 11 cu. ft./min. or 15,840 cu. ft./day.

TABLE II—TWO STAGE Roto-Aeration of Cheese Waste, No Continuous Sludge Return, 2.8 Hr. Settling

Raw BOD Lb./Day	Aeration Tank Capacity Cu. Ft./Lb. BOD	Air Supply Cu. Ft./Lb. BOD	BOD Removal	Detention Period In Aeration Tanks Hr.
26	30.8	775	98.1	15.4
41.5	19.3	485	98.1	15.4
47	17.0	428	96.7	15.4
53	15.0	380	91.8	15.4
70	11.4	288	91.3	15.4
97	8.25	208	90.0	15.4

Raw feed rate 6.5 gpm. continuously (9360 gal. per day).
Aerator capacity 400 cu. ft. each (800 cu. ft. total or 6,000 gal.).
Equalizing tank capacity, 3,000 gal.
Clarifier capacity, 1,100 gal.
Sludge removal, once a day.
Total air supply, 14 cfm. or 20,160 cu. ft./day.

Raw feed pump was set at 6.5 gal./min., equal to 9,360 gal./day. This provides a detention period of 7.7 hr. in each aerator, or a total of 15.4 hr. aeration time and 2.8 hr. settling in clarifier. Rotors delivered a total of 14 cfm. air equal to 20,160 cu. ft. per day.

Detention periods and amount of air were kept constant. By daily checking the BOD of raw and final on 24 hr. composite samples, we were able to figure pounds of raw BOD per day and percentage of BOD removal that was attained.

New Plant Proves Out

Testing started in Dec. 1953 and first results of these experiments are shown in Table II. Figures are arranged according to BOD load treated per day (from 26-97 lb.). Air supply per pound of raw BOD dropped from 775-208 cu. ft.

It can be seen that, with 2-stage aeration, it is possible to get up to 98% BOD removal at 14.5 hr. detention period. This was not possible with our previous single-stage treatment. Furthermore, it is shown that 208 cu. ft. air are sufficient to get 90% BOD removal. Since the BOD removal drops with the diminishing air supply, it is evident that the air is the limiting factor.

In order to get more than 90% BOD removal, which is necessary with these strong wastes, we have to provide more air—it seems that about 400 cu. ft. are necessary to get 95% or 96% BOD removal. Therefore, we are now trying to step up efficiency of rotors in order to provide 14-15 cfm. air in each aerator—double previous input. This would be enough to treat about 100 lb. raw BOD per day (representing average load at cheese factory) at rate of 95% BOD removal.

Whereas other aeration methods are using from 950-2,000 cfm. air per lb. raw BOD, we are using 200-450 cfm. to get the same results. Furthermore, we never had any trouble with clogging and could handle the foam equally well.

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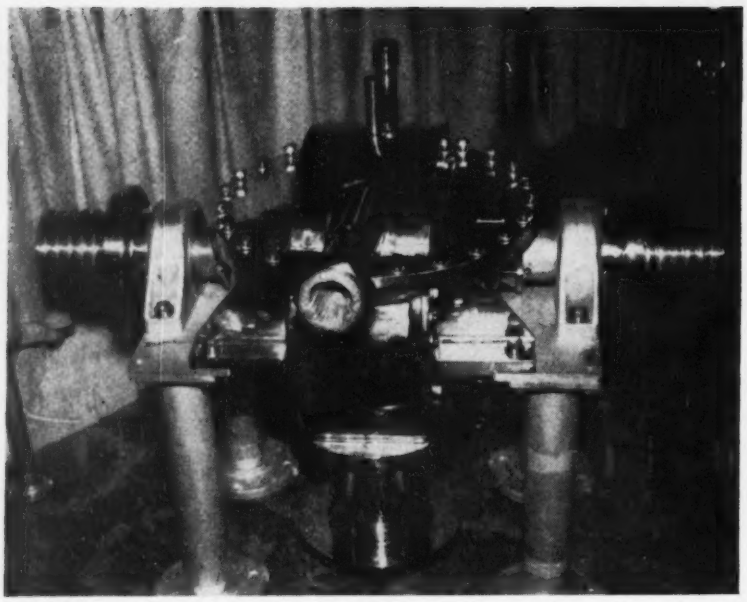
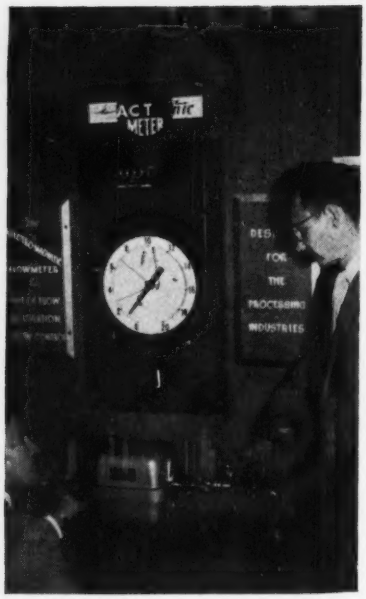
Above feature article is from a talk, "New Developments in Dairy Waste Treatment," presented at the recent Industrial Waste Conference, Purdue University, Lafayette, Ind.



PRESSURE COMMINUTOR permits 75 psi. on product, or on cooling or heating medium. Pressure on product excludes air and permits proportioning of feed. Steam pressure blanches product; CO_2 snow cools it. Comminutor is fed by pumps.—W. J. Fitzpatrick Co., Chicago. (54A)

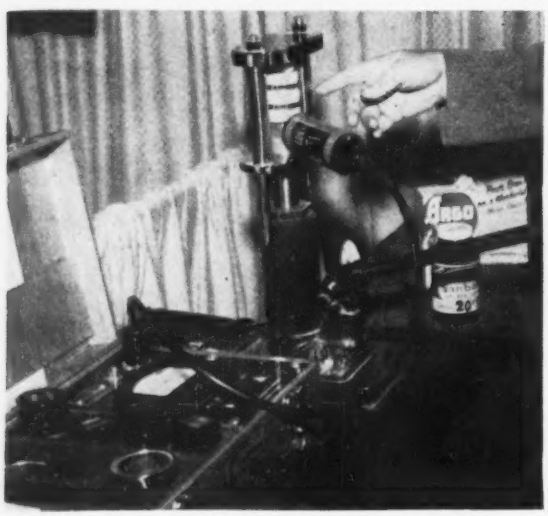


ELECTRONIC flow indicator and recorder has electrodes in Teflon-lined stainless tube. Flow is integrated.—Bowser, Inc., Fort Wayne, Ind. (54B)

BUILT-IN light source speeds scale reading in this new hand refractometer. Instrument has temperature-compensation feature.—American Optical Co., Buffalo, N. Y. (54C)

New Technical Tools

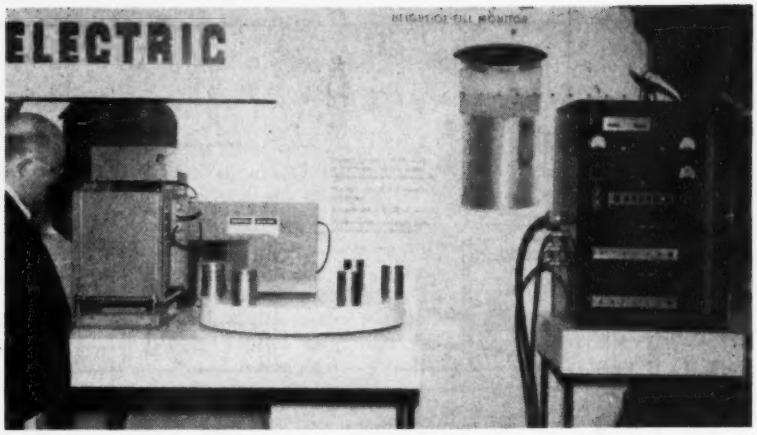
Innovations and advances in machines and devices for processing, packaging, and quality control exhibited at IFT show in Los Angeles



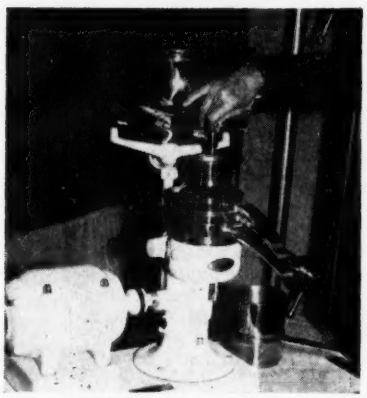
MOISTURE is measured accurately in 1 min. by electronic cell. Granules, shreds, or powder are compressed hydraulically to negate variation and purge air.—Moisture Register Co., Alhambra, Calif. (54D)

EXACT AMOUNTS of MSG are metered into packages at 400/min. by this unit, with no drip loss. Liquid is sprayed or streamed into container.—International Minerals & Chemical Co., Chicago. (54E)

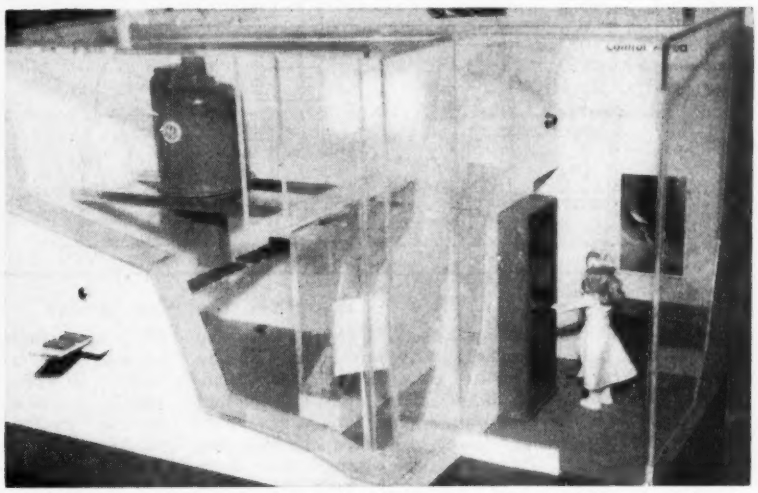
SMALL MILL for production mixing or grinding at rate of 4 to 25 gpm. Has quick adjustment to 0.001 in.—Morehouse Industries, Los Angeles. (55A)



DETECTOR directs X-ray beam through containers to sensitive crystal and senses fill variations of ±1/64th in. at 900 per min. Checks over- or under-fill. Monitors liquid or free-flowing solids.—General Electric Co., Milwaukee. (55B)



MULTI-PURPOSE Centriwesta lab centrifuge. Has 4 interchangeable bowls; cap., 0.2-2 gpm.; speed to 12,000 rpm. (7,500-g's).—Cherry-Burrell Corp., Chicago. (55C)

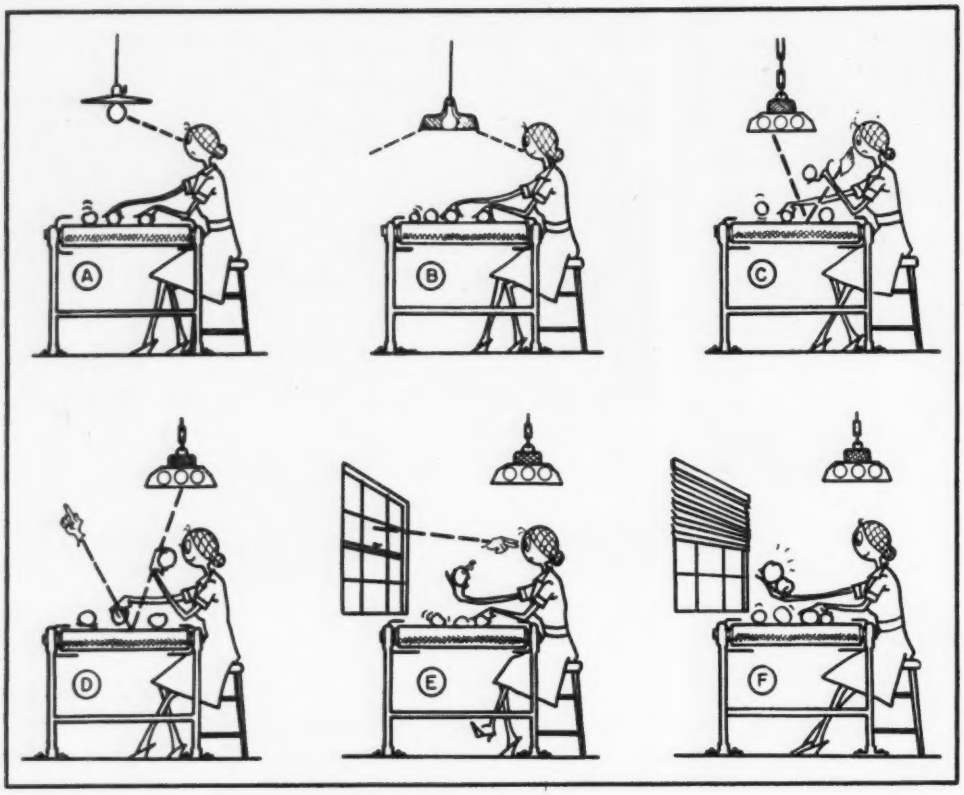


RADIATION of packaged foods on conveyor by cold sterilization system is portrayed in this special model of production setup. Product passes under cathode-ray machine, as depicted at left. Bread sterilized by this method has kept fresh for months.—General Electric Co., Milwaukee. (55D)

CONSISTENCY recorder (center) is actuated by power input to dough-mixer motor. Simple temperature indicator-controller is at left; dual unit at right.—Minneapolis-Honeywell Regulator Co., Philadelphia. (55E)

PROCESS temperature is precisely controlled by pneumatic Transet system (right) for heat exchangers. Retort time-temperature-venting controller is at left.—Taylor Instrument Co's., Rochester, N. Y. (55F)

For more information, circle key numbers (at ends of captions) on Reader Service coupon, page 227



Glare and the Way to Lick It

Three causes and cures of glare. (A): Direct glare from bare light bulb puts too much light in worker's eyes, too little on work itself. (B): Shading bare lamps directs light where it belongs, keeps it out of worker's eyes. This saves up to 60% of light that might be wasted on walls and ceiling. (C): Reflected glare often is even more objectionable. Prime causes are wrong placement of lights and use of sources of too high brightness. (D): Relocating fixture has eliminated reflected glare from worker's eyes. But this wouldn't protect worker on opposite side of belt. A baffle down middle provides this protection. (E): Daylight shining directly into eyes is bad, as are bright patches of sunlight on walls and floors or anywhere within field of vision. (F): Shading windows or diffusing light to a low brightness guards worker.

Plant Lighting

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FRANK C. LAMB

National Canners Assn., Western Branch Laboratories, Berkeley, Calif.

Good lighting can play a major role in guarding employees against eyestrain and eye fatigue, and in prolonging the period in which the human eye can carry out its normal functions without impairment.

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There are seven prime benefits gained through good food-plant lighting—

1. *Increased production*—Resulting from greater efficiency of employees.

2. *Better workmanship*—Employees are better able to perform critical seeing tasks, and they make fewer mistakes.

3. *Less eyestrain*—And accordingly less fatigue and less danger of permanent visual impairment.

4. *Continued production by older employees*—More light is required by older people for the performance of critical seeing tasks.

5. *Reduction in accidents*—Frequently, accidents are caused by work-

ers moving from a brightly lighted area to a dimly lighted one, since the eye is unable to accommodate to sudden changes of lighting. Poorly lighted machinery often is a cause of accidents.

6. *Better sanitation*—Dirt has a tendency to accumulate in dark corners. Good lighting is an incentive to improved sanitation.

7. *Improved morale*—A well-lighted establishment is a more pleasant place in which to work than a poorly lighted one.

Research on Lighting

In 1942 the American Standards Assn. approved an industrial lighting code titled, *American Recommended Practice of Industrial Lighting*. This publication contained only a single reference to the canning industry: "Canning and Preserving—20 footcandles".

To remedy this deficiency, the Illuminating Engineering Society set up its Subcommittee on Lighting in the Canning Industry in 1944. This group comprised several lighting engineers in the San Francisco area and a representative of the National Canners' Assn.'s Western Branch Laboratories. A research fellowship, sponsored by N.C.A., was established at Stanford University in 1946 under the direction of Dr. Leland Brown and the work was continued for three years.

During this period, cooperation was obtained from lighting engineers, suppliers of lighting equipment, the N.C.A., and a number of fruit and vegetable canneries in the Northern California area. A doctorate thesis, *Maximizing Color Differences*, was prepared by David C. White from work done on this fellowship.

A bulletin titled *Lighting for Canneries* then was prepared by the lighting subcommittee and published in Jan. 1950.* And further details of many of the subjects mentioned here will be found in it.

Now for an examination of the principles of good lighting—

Intensity of Light

Foremost requirement is that enough light be provided for all visual tasks.

The intensity is measured in terms of footcandles by means of a light meter. This instrument is a simple photoelectric device similar to a photographic exposure meter. Generally, it is available from manufacturers of lighting equipment or it may be borrowed from local lighting companies.

* Copies available at 50c. each from National Canners Assn., 1950 Sixth St., Berkeley, Calif., or from A. D. Hinckley, Illuminating Engineering Society, 1860 Broadway, New York City 23, N. Y.

How Modern Demands on Eyes Make Proper Lighting Vital

Today, we are required to perform seeing tasks vastly different from those of our ancestors.

Formerly, man lived primarily out-of-doors and accordingly was accustomed to working under natural lighting. But then, some 500 years ago, highly detailed visual work had its inception with the development of printing.

Now, almost all of our difficult visual work is done indoors, at close range under a small fraction of the amount of light found outdoors, and often under generally poor lighting conditions.

It's not surprising, then, that defective vision has increased to the extent that adult employees with unimpaired vision now are exceptions. Hence, the great need for proper lighting to protect vision against strain and maintain seeing-performance at the optimum.—*F.C.L.*

This light meter is simple to use and provides information that cannot be obtained by visual inspection of a lighting system. The human eye, because of its great range of adaptability, is highly unreliable in judging light intensities and not dependable for evaluating a lighting system.

The unit of light intensity is the footcandle, which is the amount of light produced by a candle of standard dimensions on a plane surface at a distance of 1 ft. Lighting recommendations are given in terms of footcandles.

The unit of brightness is the footlambert, with the brightness of a light source and the intensity of light reflected from a surface expressed in footlamberts. A light meter also may be used to measure reflected light, and this measurement is useful in deter-

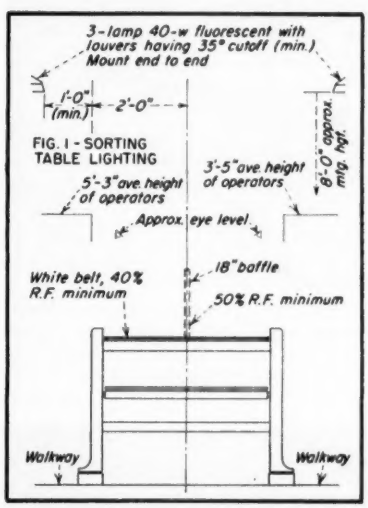
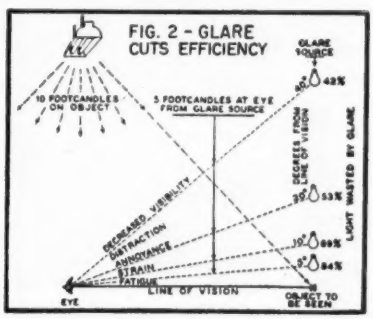
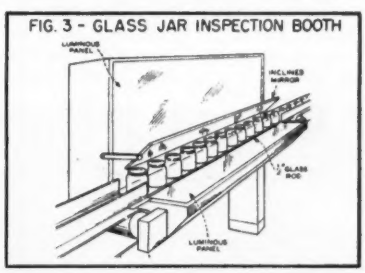
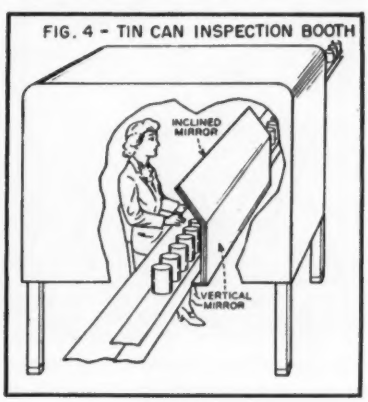
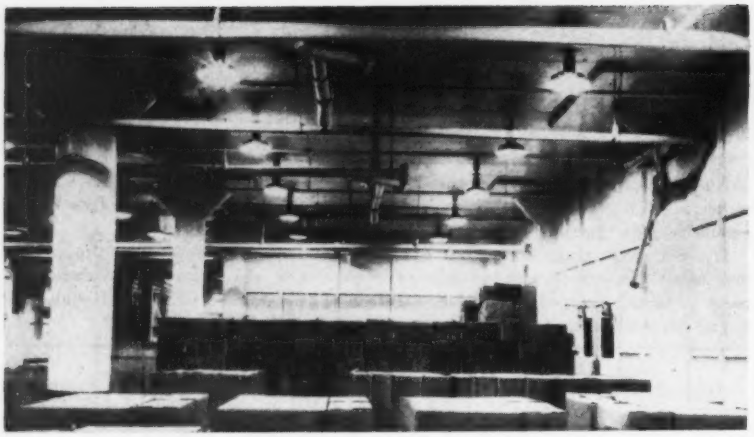


FIG. 1. (above): Lighting for a sorting table for apricots and peaches. Two-lamp luminaires with louvers, having minimum cut-off angle of 35 deg. mounted end-to-end, produce 45-60 footcandles on grading belt. Three-lamp fixtures supply 55-75 footcandles. Recommended is minimum reflection factor of 50% on all surfaces. Baffle on centerline eliminates reflected glare. Height of this baffle will vary with belt width, position, and height of lighting unit above working surface. **FIG. 2** (top right): Visual efficiency falls and annoyance rises as source of glare approaches field of vision. **FIG. 3** (center right): Glass jar inspection booth consists of horizontal and vertical luminous panels with inclined mirror permitting inspection of jar interiors. **FIG. 4** (right): Tin can inspection booth has vertical and inclined mirrors to permit inspection of exteriors and interiors of cans. Brightness is about 400 footlamberts.

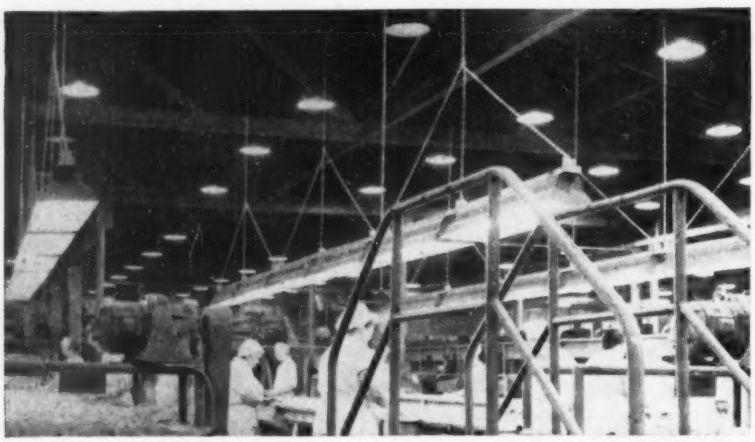








RECEIVING AREA gets 10 footcandles with 150w. standard dome fixtures on 10x10-ft. centers at ceiling height of 13 ft. 6 in. Walls and ceilings are white, with semi-gloss surface having a 75-80% reflection factor.



INSPECTION of fruit (peaches) under 100 footcandles of supplementary lighting by three-lamp fluorescent fixtures. The general lighting is by 300w. inside-frosted lamps in standard dome reflectors providing 35 footcandles. This reduces contrast between bright peaches and surrounding area. Note closed ends and cover glasses on fluorescents.

HERE, the belt lighting is by silvered lamp diffusers on 10-ft. centers, 9-ft. high, providing 35 footcandles of general illumination.

mining the reflection factor of a surface.

Intensity of light reflected from the surface of an object (in footlamberts) divided by intensity of light falling upon the object (in footcandles) is the reflection factor and is expressed in percent. In other words, intensity of light falling upon an object multiplied by the reflection factor equals the brightness of the object in footlamberts.

It is to be noted that footcandles and footlamberts actually are the same units and can be measured by the same meter. Only difference is that in the case of footcandles the light falling upon an object is being measured, while in the case of footlamberts the light reflected by the object or originating in it is being gaged.

Maintenance of Illumination

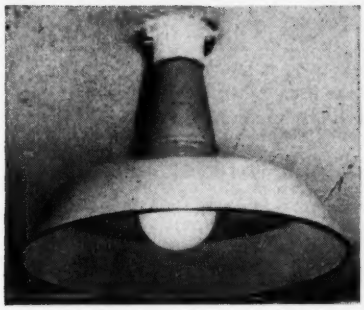
When a new lighting system is established and the fixtures are clean, a maximum of light is produced. The amount of light gradually decreases as the fixtures become dirty and the illuminants age. It is recommended that a lighting system be so designed that it produces at least 50% more than the recommended amount of light under most favorable conditions.

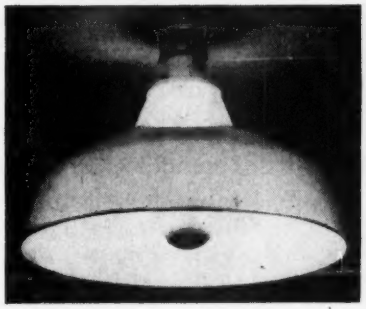
In locations where dirt accumulates rapidly, the system should produce 65% more than the recommended light when the fixtures are new and clean. When the illumination has fallen to 70% of the recommended value, the lighting equipment should be washed. Washing can best be accomplished by removing the fixtures to a place where washing can be done thoroughly and efficiently (not on the top of a tall ladder). For this reason, completely removable fixtures are recommended wherever practicable. Cover glasses on all fixtures facilitate cleaning and increase their life by protecting them from moisture.

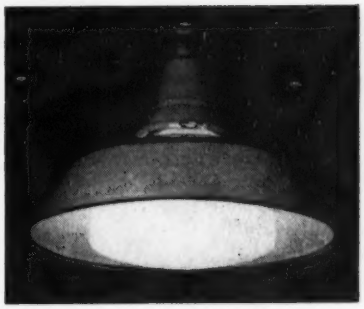
Lamps should be replaced not only when they burn out, but also when they deteriorate to the point where they no longer produce adequate light. Lamps may be changed one by one as they burn out. However, many companies consider it more economical to replace all of the lights at one time. This results in less interruption of work and a saving of labor at the expense of using somewhat more lamps.

A suggested replacement program is to replace the lamps as they burn out until 20% have failed, at which time all of the lamps are replaced. Thus, 20% of the best of the replaced lamps are saved, and these then are used to replace burned out lamps, until they are all used up. Then it is time for another complete replacement.

Specific Lamps for Specific Tasks







SHOWN ARE typical units for different areas of the plant. Left: Frosted incandescent light with standard porcelain reflector. Fixture is suitable for lighting storage and receiving areas. Center: Silvered bowl diffuser with silver bowl lamp. Provides excellent general illumination for preparation and processing rooms. Right: Combination glass and steel diffuser. Used with clear bulb it provides good illumination for preparation and canning areas, is easy to clean.

One of the principal causes of poor seeing conditions and eyestrain is glare. It is defined as any bright light source causing annoyance, discomfort, and eye fatigue.

Two types of glare are encountered: Direct glare and indirect or reflected glare. In the former, the source of annoyance is light shining directly into the eyes from an unprotected light source. If the light source is the sun, or the bright sky shining through a window, obvious solution is to cut out the light by means of shades or to diffuse it to a low level of brightness.

Glare from an artificial light source may be eliminated by cutting off direct exposure to the light source by means of reflectors or louvers. The protection given by a reflector or louver is governed by its "angle of cut-off". This is the angle below the horizontal at which the light source is no longer visible. A minimum angle of cut-off of 11½ deg. is recommended. In some cases a cut-off angle of 35 deg. or more is necessary to obtain maximum protection.

Glare becomes more objectionable as brightness of light source increases. Brightness may be cut by increasing area of the light source, as by means of diffusing bowls for incandescent lamps or diffusing covers for fluorescent lamps, also by means of indirect illumination. Fluorescent lamps are less bright than incandescents because the light source is distributed over a larger area. Therefore, these lamps produce less glare.

Another way to eliminate glare is by the use of silver bowl lamps. These transmit all of the light upward into a diffusing bowl or onto the ceiling. Further, closed ends on fluorescent fixtures often are helpful when the ends of these units are within the field of vision.

Reflected glare results from the reflection of bright objects from shiny surfaces. This type of glare is difficult to overcome in canneries because the wet product and wet conveyor belts offer many shiny surfaces that can reflect bright objects. Glass and tinplate containers also present highly reflecting surfaces.

Proper selection and placement of lights can do much to suppress reflected glare. For example, lights placed directly over an inspection belt, at a fairly low level above the belt, provide a source of reflected glare that may be objectionable to workers at the belt. Using luminaires of low brightness such as fluorescent lights, or well-diffused incandescent lights, produces less objectionable glare. Raising the lights farther above the belt also lessens it, provided the cut-off angle is sufficient to prevent direct glare in the workers' eyes.

In canning areas, placement of the lights above and behind the worker abolishes the glare for the worker on one side of the belt, but does not protect the worker on the other side. A baffle placed between rows of workers facing each other solves this. Recommended (Fig. 1) is placement of rows of fluorescents end to end at an 8 ft. height over the aisles between the sorting tables or canning sinks, 1 ft. from the edge of the aisle and with a cut-off angle of 35 deg. However, modifications may have to be made to fit individual circumstances.

Moreover glare lowers the efficiency of utilization of the illumination provided for a job (Fig. 2). Footcandle recommendations usually are given as "glare-free" lighting.

Distribution and Diffusion of Light

There should be uniform distribution of light over a working area, and harsh shadows should be eliminated. Much can be accomplished by painting dark objects with light colored paints having high reflection factors (but not with a high gloss). Harsh shadows often can be abolished by painting under surfaces of overhanging objects with paint having a high reflection factor (65% or over).

A distinction must be made between "general lighting" and "supplementary lighting". Critical seeing areas, such as inspection and grading belts, must be illuminated to a higher level than surrounding areas. However, the contrast between the two areas must not be too great.

Reason for this is that employees occasionally look up from their work and train their vision momentarily on surrounding objects. If the contrast in light intensity is too great, time and energy are required for the worker to make the necessary visual adjustment from an area of high light intensity to one of lower intensity. A similar adjustment must be made when the worker's vision returns to his work. This readjustment, when made many times a day, lowers the employee's efficiency and leads to eye fatigue.

Ideally, illumination of the surrounding area should be the same as the work area. This generally being economically unfeasible, a compromise must be made: It is recommended that surrounding illumination should never be less than 1/10th the illumination (measured in footcandles) of the working area. For more critical work, ratios of 1 to 5 or less may be required.

Now to the matter of relation of lighting to ability to see contrast and to visual acuity:

Critical seeing tasks in canneries usually depend upon the ability of the worker to see contrasts. For example, in grading fruit the employee must be able to distinguish between defects and normal fruit tissue and between fruit of different degrees of maturity as judged by color contrast. It has been demonstrated that increasing the brightness of the product increases the ability to see differences. And experi-

ments have shown that 90% of the maximum ability to see contrast occurs when the brightness of the product as well as of the surrounding area is 20 footlamberts.

Normal range of reflectance factors in canneries varies from 5% with very dark objects to 60% with light objects. It will be recalled that brightness is the light intensity falling on an object in footcandles times the reflection factor. Therefore, 90% of the maximum ability to see contrast can be obtained with 400 to 35 footcandles of glare-free lighting. This provides the theoretical basis for the recommendations made for the lighting of inspection areas in canneries.

Although high contrast is wanted between the characteristics that must be distinguished in critical inspection and grading work, low contrast in brightness is desirable between the objects being inspected and the surrounding area. In other words, the area immediately surrounding the examined objects should have about the same reflection factor as the objects themselves. This means that in inspecting light colored fruit or vegetables on an inspection belt, a white or tan colored belt should give better results than a dark colored belt.

As in contrast, the case of visual acuity, or ability to see fine detail, also rises as brightness rises. It is well known that more light is required to read the numbers in a phone book than is required to read the headlines of a newspaper. Here, it has been shown that 80% of maximum visual acuity occurs at 25 footlamberts of product brightness. This would require a range of 500 to 40 footcandles of glare-free lighting in canneries.

Speed of vision also increases with object brightness. Its known that in taking a photo, a shorter exposure can be used when the light is intense than when it is dim. The human eye acts in much the same way as a camera, in that the rate at which visual images are recorded on the retina and transmitted to the brain is dependent on light intensity.

This is particularly important in canning, since visual inspection customarily is made of moving objects on a conveyor belt. Increases in the ability to see detail in moving objects is realized up to about 20 footlamberts of product brightness.

Lighting to See Color Differences

In the research at Stanford, there was a great deal of work on the use of colored light to enhance color differences in fruit and vegetables. Although, from theoretical considerations, it should have been possible to afford greater sensitivity in the visual selection of fruit of different maturities by the use of light of a proper color to enhance these differences, from a practical standpoint, light approaching daylight in quality proved to be most effective.

So recommendation was made that luminaires producing light of a quality similar to daylight be used for all critical color-grading work. Daylight fluorescent lamps were suggested as a means of attaining this quality of light. Only minor advantages were realized, however, when "daylight" luminaires were used in place of other high quality light sources.

Specific Recommendations for Cannery Lighting

Since this work was completed, other types of luminaires have become available. Among these are the "cool" and "warm" types of fluorescent lamps and the special fixtures containing a combination of fluorescent and incandescent light sources, which will be discussed later.

Given here are footcandle recommendations chosen for the most favorable conditions obtainable economically. With technological improvements, it may be possible to raise these footcandle levels to provide more nearly ideal conditions.

First, recommendations for general illumination:

Receiving Department—10 footcandles, except near sorting and grading units, where 20 footcandles should be supplied.

Preparation Department—20 footcandles. Low brightness luminaires should be used (white bowl or silvered bowl lamps are recommended when incandescent light is used). Danger of food contamination from broken or shattered units should be considered, and heat resistant glass covers should be employed where necessary.

Container Handling—5 footcandles, except in inspection areas, where 20 footcandles should be provided. Requirements are similar to those of preparation department.

Canning Department—20 footcandles. Protection from food contamination is particularly important.

Processing Department—10-20 footcandles. More light is needed for critical operations, such as around syruping and brining areas, closing machines, and for reading charts and dials where 25 footcandles or more should be supplied.

Reflector spot or flood lamps with hard glass bulbs may be advantageous in these area. But there should be precautions against exposure of light sockets to moisture conditions and against mechanical breakage. Severe steam conditions make utilization of vapor-tight units with hard glass resistant covers desirable.

Office Areas—30 footcandles for intermittent reading and writing and 50 footcandles for prolonged close work.

Storage and Warehouse Areas—5 footcandles. Inspection and labeling or cartoning areas require about 20 footcandles and can unscramblers 10 footcandles. Lights should be suspended over aisles, not surrounded by stacks. Movable lights might be advantageous here.

Laboratories and Cutting Rooms—30 footcandles for general illumination, 50 footcandles where more critical tasks are performed.

Supplementary Lighting

By supplementary lighting is meant the special lighting that must be added to general lighting where seeing problems are critical.

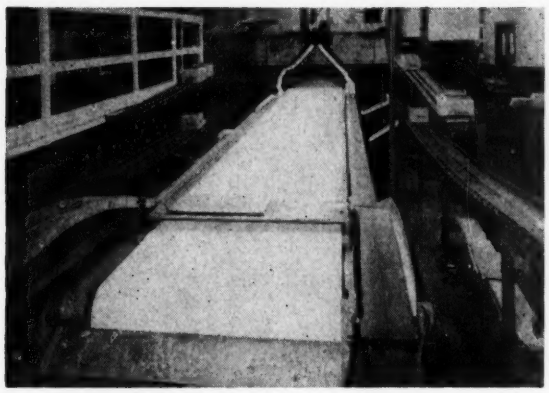
Sorting and Canning. These operations require highly critical seeing, so special attention should be devoted to proper lighting. Amount of light required depends on the reflection factor of the product being examined. Sorting light colored fruit, such as apricots and peaches, requires 85-125 footcandles for maximum efficiency. Tomatoes with a 25% reflection factor should have from 100-150 footcandles on the final sorting belt. Somewhat less illumination can be used for preliminary sorting operations. Canning tables for apricots and peaches should have from 50-80 footcandles of illumination, and tomatoes 75-100 footcandles.

Optimum lighting requirements for other fruits and vegetables (except olives) have not been worked out. Fluorescent lights are recommended for these high levels of illumination, since there is lower brightness and less heat with these units. Instant-start fluorescent units are recommended to reduce flicker.

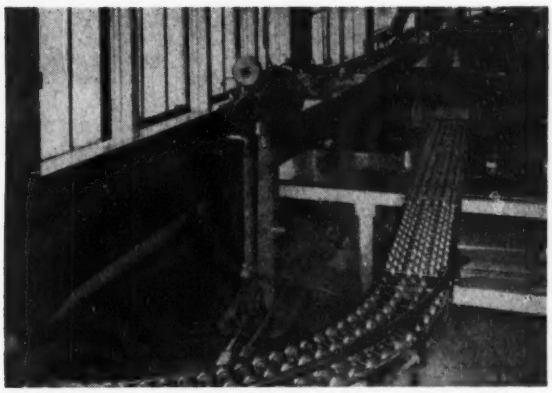
Container Inspection. Advised for inspecting glass jars (Fig. 3) are inspection booths containing two luminous panels, one horizontal and one vertical, illuminated to a brightness of 300 to 400 footlamberts by fluorescent lights placed behind them.

The jars are made to pass over the horizontal panel and in front of the vertical panel, with a mirror placed at a 45-deg. angle above the jars to permit inspection of their interiors. The booth is surrounded on three sides by an enclosure with white walls and ceiling, illuminated to 150 footcandles. And it should be deep enough to cut off the inspector's view of the rest of the plant.

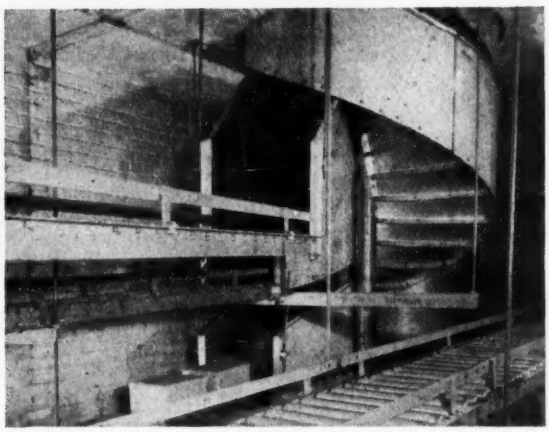
(*Turn to page* 191)



Belts speed items to packing . . .



. . . then wheels convey sealed packages to . . .



. . . chutes that discharge them to rollers

. . . going to stacking stations

MECHANICAL MOVERS

Make Short Work of Handling

Astute linking of four types of conveyors whisks the finished goods between make-up, packing, sealing, and stacking stations with: ¶ Less labor . . . ¶ Minimized breakage . . . ¶ No clutter and congestion, and . . . ¶ Vital all-around savings in space and time

Time, labor, and space are saved, product breakage reduced, manual tasks minimized, and clutter and congestion eliminated through mechanizing of package operations at the plant of Robert A. Johnston Co., manufacturer of fine candies, cookies, and chocolate at Milwaukee, Wis.

Installation of a handling system comprised of belt, wheel, roller conveyors, and spiral chutes did the trick. This system was developed by Johnston's plant engineers in collaboration with engineers from the Standard Conveyor Co., North St. Paul, Minn.

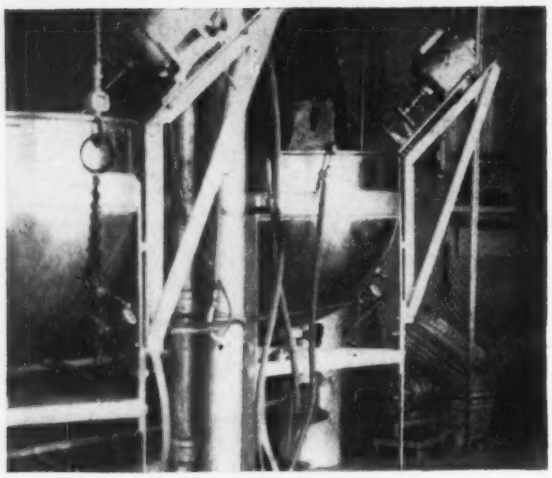
The system links operations in the packing rooms, storage rooms, and shipping floor. The cookie and biscuit packing rooms are located on the fourth floor; shipping is on the first.

Previous to the conveyor installation, packaged goods had to be placed on hand trucks, wheeled to the freight elevators, moved down to the first or shipping floor, and then rehandled from the hand-trucks in storing or making up shipments.

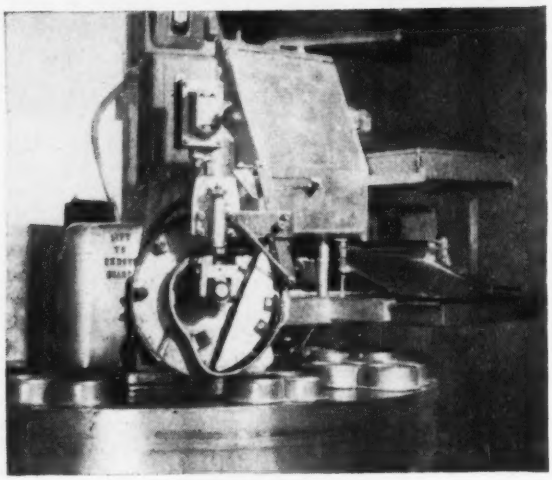
Hundreds of trips per day were required, as well as repeated stacking,

(*Turn to page* 214)

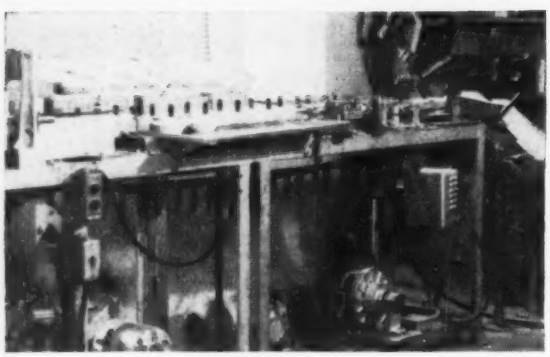
NEW LINE UNITS (Keyed on Diagram) →



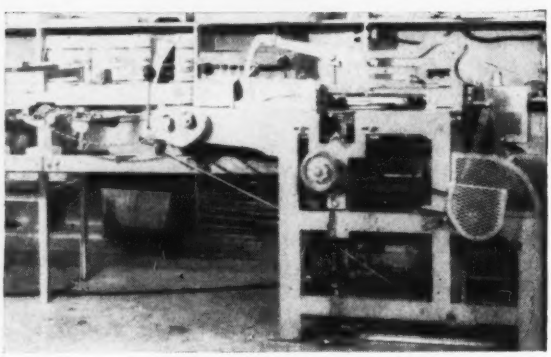
A—Ingredient Kettles



B—Pie Machine



C—Cartoner



D—Wrapper

Converts Locker Plant *To Frozen-Dinner Processing*

JUST WHAT IT INVOLVED—In sage procurement of prime handling, processing, packaging units . . . astute layout around existing refrigeration facilities . . . and stepped-up sanitation measures

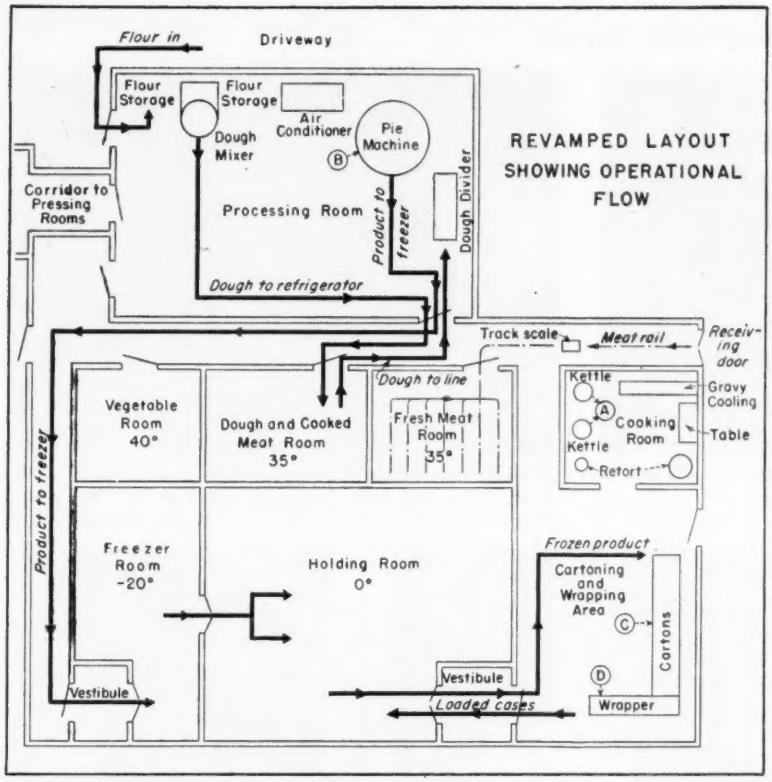
R. T. FOREMAN
Tasty Foods Co., Burlington, Ky.

In a radical plant change, we switched from a food-locker operation to the processing of frozen food dinners—beef pies, barbecued chicken, and similar items.

What such a revision involved for our organization, now Tasty Foods Co. of Burlington, Ky., well may be imagined. Here's how we finally set up the plant and now operate:

Directly across the hallway from our processing room we placed three cold storage rooms. The first holds fresh meat; the second, dough and cooked meat. Both of these rooms are maintained at a temperature of 35 deg. F. The third room, held at 40 F., provides refrigerated vegetable storage. All three are carried by a 5-hp. Freon compressor, which also supplies refrigeration for a gravy cooling tank.

From the processing room finished goods move through a blast freezer room, connected by swinging doors to a zero holding room. As products are removed from the latter, they are cartoned, wrapped, packed in ship-



pers, and immediately returned thereto.

In the preparation of all beef, cooking is at 10 lb. pressure for approximately 30 min. Accurate control of time and temperature produces uniform yield and controlled quality. Pressure is automatically regulated within ±1 lb., thus controlling temperature.

An automatic timer signals, with gong alarm, end of the cooking period. Empirical charts have been set up for compensating the difference in "warm-up" time between small and large batches. Retort sizes are 100 and 200 gal.

We have found that "small batch" cooking gives superior results, although it necessarily increases handling. Divided loads are used in the retorts, because of limited head room. A ½ hp. electric hoist is used to load and unload the retorts.

Mechanized handling reduces operator fatigue and increases efficiency. Cranes are mounted above each of the retorts, permitting transfer of raw meat in baskets directly from hand trucks into retorts, and similar transfer of cooked meat and retorts onto dollies, for movement into the cooler.

Handling Liquids

Beef broth is handled under pressure from the retorts into open steam jacketed kettles in which gravy and sauces are prepared. Upon completion of the cooking period, while the retort still carries pressure, a hose is attached to the bottom drain of the retort, and the broth automatically is blown over to the kettles by steam pressure. All open kettles have ½ hp. conventional twin-propeller agitators. Finished sauces and gravy are pumped into refrigerated holding tanks. Here, they are rapidly cooled to the lowest temperature at which they can properly be handled into final containers.

The refrigrated tank for cooling gravy is the "cold wall" type, with paddle agitators. To obtain high surge capacity, Freon is used to cool water, to 40 deg. F., for circulating through the walls of the tank.

Gravy is pre-cooled while still in the open kettle, tap water replacing the steam used for cooking. Gravy is then transferred, at a temperature of 100 F., to the cooling vat. Final cooling to 70 F. takes less than 30 min.

Sauce and gravy are moved from open kettle into cooling tank by a "Flexflo" (Cherry-Burrell) sanitary centrifugal pump. Sauce or gravy flows by gravity from the cooling tank into containers which are wheeled into the pie machine area.

Plant sanitation is maintained at high levels conforming with B.A.I. inspection. Although a bacteria count of 100,000 per gram is permissible in most of the products, the plant standards are such that bacterial count consistently is maintained between 15,000 and 25,000.

A clean-up crew reports for duty at 5 P.M., when the day shift ends. This crew takes apart all pipe lines and brushes the pipe and fittings thoroughly inside and out. All small items, such as cans, trays, and molds from the pie machine, are moved to the washing area. "Orvus" detergent (Proctor & Gamble) is used in 180 F. water to remove grease. A clear rinse in 180 F. water follows, with a final dip in a chlorine solution, concentration 100 ppm. This solution is made of Pitchlor, (Columbia-Southern Chemical Corp.) following the directions on the container.

Gadgets Help

Beef pies are produced on a turret type pie machine, (Colborne Mfg. Co.). Aided by several "gadgets" added after purchase of the machine, the operators are able to achieve an overall efficiency of 95% of theoretical machine output.

Pie machine modifications: The dough roller was shifted clockwise around the machine, and mounted partially outboard, thus opening up another operator station. A counter has been added to give the supervisor a continuous check on machine performance. Thus, slowing of the line below 40 pies per min. is immediately apparent and corrective measures are taken before the production loss becomes serious.

Further, the crimping roll, as originally designed, is heated by electric strip heaters. A reciprocating acetylene flame was added to provide quick warm-up, and to assist the electric heaters in maintaining proper crimping temperature. Automatic fillers have been added to permit accurate control of the quantity of sauce.

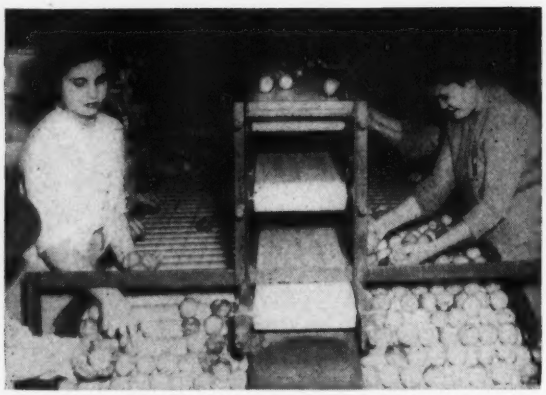
Mechanization of the cartoning and wrapping operation produces an output in excess of 40 loaded cartons per minute, with one operator on the cartoning machine, one on the wrapping machine, and one handler. The cartoning machine (R. A. Jones & Co.) automatically feeds, opens, and passes the carton in front of the loading station, where the operator inserts the product. Both ends of the carton then are automatically tucked, and the package is discharged without further handling onto the infeed flights of the Hayssen machine.

As wrapped packages emerge, one operator makes up shippers, inserts the finished packages, and seals. Cartoning machine and wrapper are run at a speed slightly greater than the output of the pie machine, to give ample surge capacity.

(Turn to page 205)

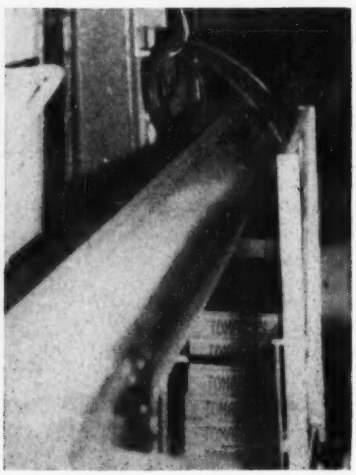
Tomatoes Quickly Cleaned and Sorted

1 Workers dump tomatoes into chutes, where long aluminum shaker bars gently roll fruit to grading section. Foreign matter falls through bars to waste cans.



2 Aluminum rollers carry tomatoes in front of graders who pick out culls. Tomatoes move on to sorters who place ripes, pinks, and "turns" on different belts.

3 Chutes receive tomatoes. Pinks drop into chute at extreme right; turns terminate in second chute from right; greens load into two chutes at left. Pinks, turns, and greens are placed in lugs for return to ripening rooms.



4 Conveyor belt runs ripe tomatoes from top belt on sorting line around the building to tray-packing section.

Doubles Plant Capacity by Mechanization, and

Ups Worker Productivity 180%

Tomato prepackager installs special 3-tier sorter, transport belt, efficient packaging system, and sanitary aluminum conveyor rollers

ROBERT G. WHITE
R. G. White Engineering Co., Brooklyn, N. Y.

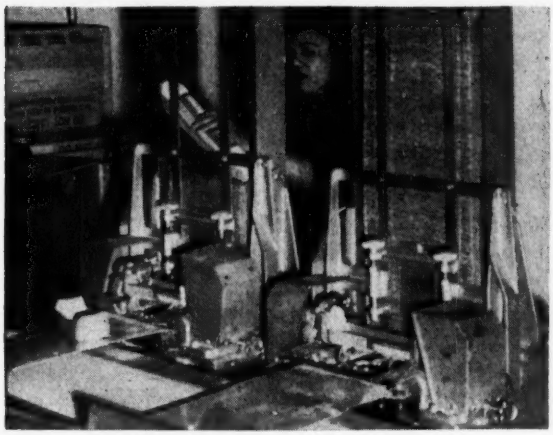
Weekly output of consumer packaged tomatoes has been increased from 7,000 to 15,000 master cartons at the Jack Esformes Corp., Bronx, N. Y.

This doubling of capacity to 150,000 lb. of tomatoes weekly has been achieved by discarding all former equipment and gearing new machinery for peak production in an efficient plant layout.

The installation includes a new grading and sorting line, a conveyor system to eliminate manual handling, plus automatic overwrapping and tray-erecting machines—all integrated into highly mechanized pre-packaging.

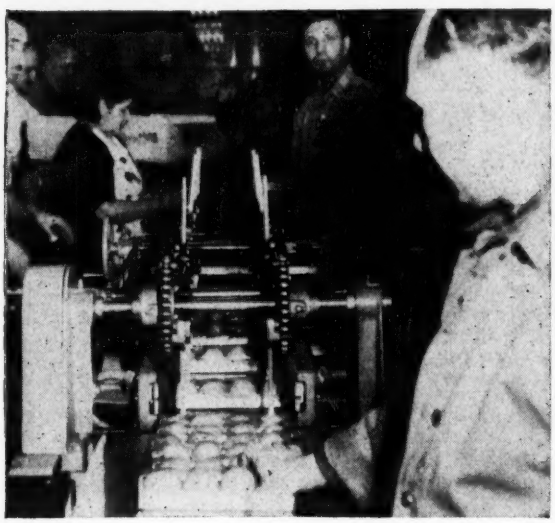
Heart of the new operation is the three-tier belt line with which the company grades and sorts fresh tomatoes at rates up to 18,000 lb. per hour. This machine, 4 ft. wide, 6 ft. high and 22 ft. long, has room for four workers on each side. Tomatoes are brought to these workers on a continuous aluminum roller conveyor, so they need not move from their positions.

Machines and Two-Step Tray Filling Speed Packaging

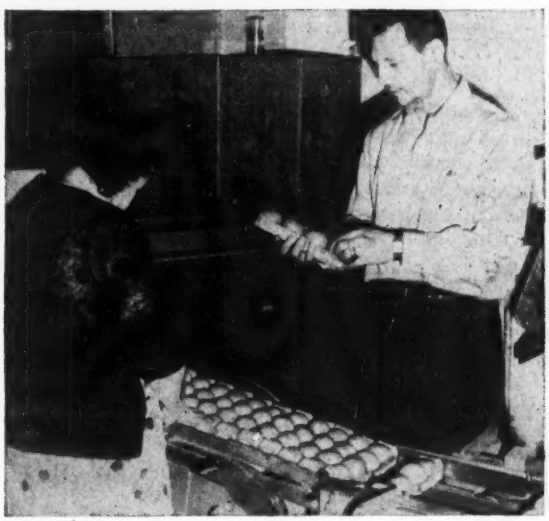


5 Paperboard trays are inserted flat into this tray-erecting machine. It sets them up and ejects them automatically onto conveyor belt at speeds up to 100 per min. Packers closest to machines load them.

6 In tray packing section, one worker places only two tomatoes in tray, and another fills the tray as it moves along. This "progressive" packing more than doubles output of system where one worker completely fills tray.



7 Filled trays are automatically conveyed from packers directly into overwrapping machine. Conveyor has a variable-speed drive.



8 Cellophane overwrapped trays emerge from machine onto a run-out table, at which point workers pack filled trays ten to a master carton.

A pressing need for increased output made obsolete the company's former sorting equipment, which consisted merely of a single rubber conveyor belt, 2 ft. wide, 20 ft. long. As many as 12 workers, 6 on each side, were required just to sort the tomatoes as they moved forward on the conveyor. Ripe tomatoes ready for packaging, and pinks and turns (tomatoes beginning to change color), were placed in lugs that flanked the workers. Only green tomatoes were conveyed to the end of the line. Sorting for color, therefore, was a slow and costly operation. The belt system, too, held the tomatoes in one position in transit and did not allow the graders to quickly spot turns and defects.

Sixteen workers were required by the old method just for grading and sorting. The new method needs only 12 and therefore provides more than a 100% increase in output and better than 180% boost in worker productivity.

Grading and sorting is more effective in the new set-up because the three-tier vertical-type conveying lines eliminate unnecessary handling of tomato lugs. Washed and waxed tomatoes are received from the shipping point in 60-lb. field crates. From the loading dock on the main floor they are carried up to the second floor by continuously moving elevators. They are then stacked within easy reach of the dumpers.

Two workers at the beginning of the sorting line dump the tomatoes into two chutes where oscillating aluminum shaker bars advance the tomatoes and allow debris to drop to waste cans below. From here the tomtatoes flow onto the aluminum roller conveyors that carry the tomatoes to the graders, on each side of the machine, who remove the culls and undersized fruit. Depending upon crop conditions, culls usually range from 2 to 15%.

Sanitary Aluminum Rollers

Aluminum rollers are used instead of the conventional wood rollers since the latter are difficult to clean and have a tendency to develop odors that permeate the plant. The aluminum rollers never rust, do not retain odors, and can be cleaned easily at the end of the day by merely wiping with a damp cloth.

The roller conveyor system simplifies and speeds sorting, since tomatoes are turned over continually as they move forward. In this way, workers do not have to pick up each tomato to check for color and also examine for blemishes, soft spots, scars, etc.

After this initial grading, the tomatoes are carried upward on the rollers to the sorting lines. Since space was at a premium in the Esformes plant, a lengthy line was impractical. The solution lay in a conveying system of three neoprene belts that lie one above the other mid-way between the workers. With the exception of the top belt, which ties into a cross conveyor, the two other belts convey the particular color of tomato to chutes at the line's end.

3-Tier Sorter's Triple Benefit

This system of vertical instead of horizontal construction is triply advantageous: (1) Production is speeded since the workers can sort with both hands and place the tomatoes onto the right belt with a minimum of effort and time. (2) Valuable floor space is conserved, often an important factor in the fresh-produce field, where crowded conditions prevail. (3) Materials handling is reduced since the graders and sorters do not have to place the sorted tomatoes into lugs, and additional workers are not needed to collect these lugs.

Just beyond the dumping area, above the rollers, is a covered jet-spray mechanism that can be adjusted for either slight dampening or thorough washing. Dampening tomatoes prior to stacking in the ripening rooms ensures freshness, even coloring, and firmness.

Washing the green tomatoes before they are graded and sorted is important as it reduces the chance of contamination in the ripening rooms. The water spray not only cleans the tomatoes, it brings to light any that are decayed or diseased. Removing these unsuitable tomatoes prevents the possibility of one or more infected tomatoes in a lug spoiling the remainder during the ripening process.

The three-tier conveyor sorting system operates in this manner: The top belt is for ripes, which are carried forward and drop off onto a cross conveyor belt that carries them around the building to the overwrapping section about 60 ft. way. The middle belt is for pinks, and the bottom belt for turns, both of which terminate in chutes.

From these chutes, pinks and turns are emptied directly into lugs and hand-trucked to the ripening rooms. The green tomatoes that are carried past the sorters on the aluminum rollers drop down into two chutes, from which they are also collected and returned to the ripening rooms.

Each ripening room has a capacity for 15 carloads of tomatoes. Normal ripening temperatures in the winter months range 65-70 deg. F.; in the summer, temperature is lowered to between 50 and 60F. Green tomatoes take from 7 to 10 days to ripen sufficiently for consumer packaging. Prepackaged tomatoes usually are either hard ripe or firm ripe, since consumers consider these the most desirable stages of ripeness.

Solves Transport Problem

The problem of getting the ripe, packageable tomatoes from the sorting section to the packaging section at the other end of the building without hauling them in lugs was solved by the "transport" conveyor belt. Hitherto, it was necessary to place the ripe tomatoes in lugs, which in turn were hand-trucked to the workers and dumped into the tray-filling bins. Two workers were needed just for this phase alone.

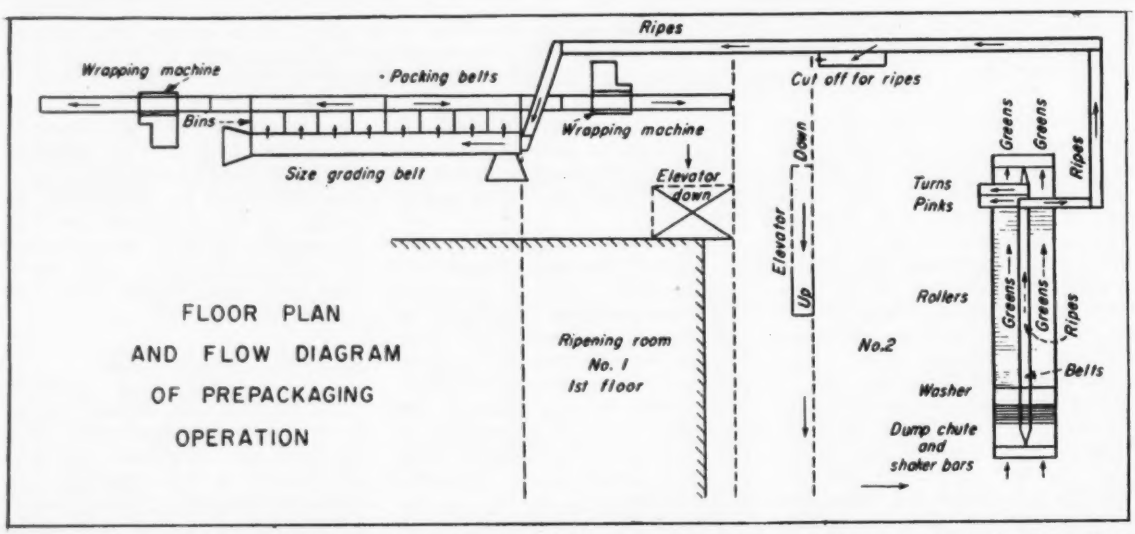
The "transport" conveyor begins at the end of the sorting line, catching the ripes as they drop from the top color sorting belt. Tomatoes continue on this 10-in. conveyor belt, which follows the contour of the building wall and lies snugly against it. Half-way on this line is a cut-off chute where a worker can divert the flow of ripes into lugs if there is a slow run of tomatoes ready for packaging, or the packaging lines are not operating.

Ripe tomatoes are transferred from the "transport" line to the packaging area by means of a conveyor belt that runs parallel to the tray-filler bins. The tomatoes then are manually distributed to the bins in front of the workers. Between the bins and workers are two tray-filling conveyor belts that lie end to end and run in opposite directions directly to the two overwrapping machines.

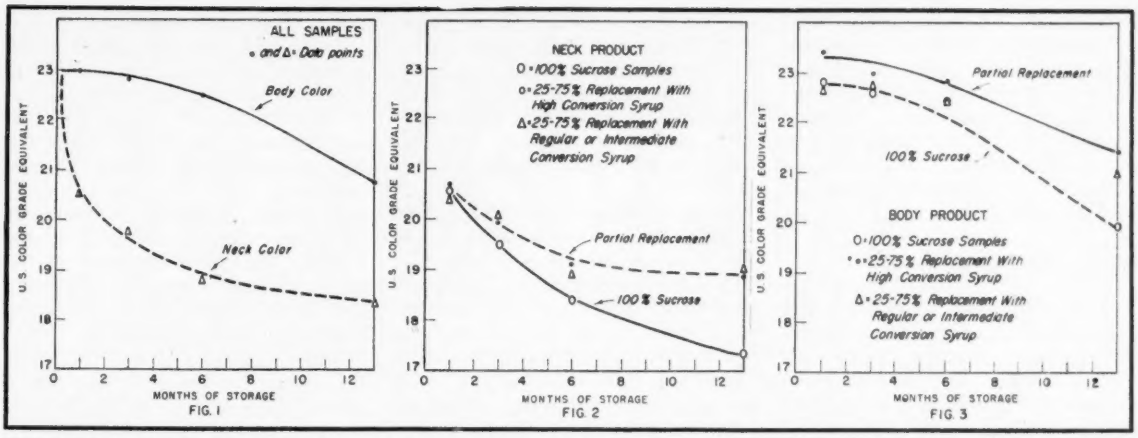
Fast Progressive Packaging

In his previous set-up, Esformes found that much time was lost when each worker filled a tray complete with four tomatoes. He has since markedly reduced this time by having each operator place only two tomatoes into a mechanically erected tray that moves down the conveyor belt between the tray-fillers and the size grading bins.

(Turn to page 231)



LIMITED floor area required this layout to utilize available space and provide continuous movement of tomatoes. Dotted lines indicate ripening rooms on first floor. Tomatoes in lugs are brought up on slatted continuous elevator (at right) and hand-trucked to sorting line. Pinks, turns, and greens are returned to ripening rooms on elevator.



STORAGE CURVES TELL the story. Left: Sharp down-chute in color quality of ketchup in bottle necks as compared with color loss in body of product. Center: Partial replacements with corn syrups significantly flatten color drop of neck product. Right: And in the body product they also show a notable slowing effect.

Puts Brake on Browning Of Ketchup in Bottle Necks

Tests Show Corn Syrup Will Do the Retarding

W. L. OGLE and A. KRAMER

Respectively, Department of Horticulture, University of Rhode Island, Kingston, Formerly Assistant Professor of Horticulture, University of Maryland; and Professor of Horticulture, University of Maryland, College Park, Md.

Protection of the bright red color of freshly packed tomato ketchup is a matter of prime importance to processors. Trouble has been that a darkening to a brown, reportedly due to oxidation, occurs on prolonged storage. And it's most pronounced in the upper 1 in. of the neck of the bottle.

Now, however, research at the Maryland Agricultural Experiment Station indicates that—

1. Color of ketchup in the necks deteriorates very rapidly during the first few months of storage, while color in the bulk of the product is maintained rather well and is not significantly altered until after 6 months' storage.

2. Rate of color deterioration in the neck substantially is retarded by use of corn syrup, and a similar effect is found in the body of the product, though to a lesser extent.

3. Both red and yellow pigments decrease during storage. But this reduction is not influenced by corn syrup.

Purpose of our program was to determine some method of controlling color-deterioration. The studies concerned color changes of ketchup in storage, and there was particular reference to the effectiveness of sweetening agents as color stabilizers.

In Sept., 1952, 58 batches of tomato ketchup were made by 11 cooperating packers in plants located in the states of Maryland, Indiana, Illinois, New Jersey, California, and Pennsylvania.

Test material was prepared by partially replacing the standard amount of sucrose required with equivalent amounts of high intermediate* or regular conversion corn syrup. Proportion of corn syrup used by these cooperators ranged from 25 to 75% of the total sugar added. In each case the control was 100% sucrose.

Samples were received at College Park and held in storage at room temperature for 1, 3, 6, and 13 months, calculated from the date the samples were prepared. No attempt was made to hold the ketchup at constant temperature. At the end of each storage period, samples were removed in triplicate and analyzed for color, total red pigments, and total yellow pigments. These determinations were made on aliquots taken from both the neck and body of each sample.

Color was determined by the use of the Hunter Color & Color Difference Meter[1] which was first standardized with a tomato red color tile. Hunter values for ketchup in the necks of bottles were obtained by inverting the bottles on optical quality plate glass placed above the viewing apparatus. Similar values also were obtained for an aliquot taken from the body of the bottle after the neck portion was removed.[2, 4] Hunter "a" and "b" values then were transformed to the equivalent U.S. Color for tomato ketchup by equation[2], as follows—

$$\text{U. S. Color score} = 12.71 + .684a - .447b^{**}$$

Determinations for total red and yellow pigments were made spectrophotometrically by a benzol extraction method[3]. A 5g. quantity of tomato ketchup was placed in a Waring Blendor with 70 ml. of benzol, mixed for 5 min., and made to 100 ml. with benzol. From this blend, a 2 ml. aliquot was pipetted into 10 ml. centrifuge tubes, made to volume with

* Data on intermediate corn syrup were combined with those on regular corn syrup for purposes of statistical analysis.

**Scores of 21 to 25: Fancy (Grade A) color. From 17 to 20: Standard (Grade C.) And values of less than 17: Substandard color.

benzol, and then centrifuged 5 min.

Transmission values were obtained by means of the Beckman Spectrophotomer at wave lengths of 435 and 490 Mu (wave lengths of maximum adsorption for yellow and red pigments, respectively). The data reported are relative values obtained from a standard curve.

Gaging the Results

Color:—To obtain information concerning color deterioration in tomato ketchup during storage, it was first necessary that a reference point of original color be fixed at the beginning of the experiment.

Fortunately, the Hunter Color Difference Meter was available whereby original color could be determined objectively and compared with any subsequent changes in storage. To develop a single expression of the Hunter values, it was necessary to transform the data into terms of U. S. Color score equivalent, already described.

The various changes in color that took place during storage are presented in Table I and Fig. 1, as average values for all samples. Fig. 1 shows that the color of ketchup in the necks of bottles deteriorated very rapidly during the first month in storage, then declined at a progressively slower rate for the samples containing 100% sucrose (Table I).

There was a net loss of 2.5 points U. S. Color score equivalent during the first month, as compared with 2.1 for the remaining 12 months. This indicates the importance of developing a means of retarding the "fast drop" in color value during the first month of storage.

Color changes in the body of the ketchup were, in comparison, of minor importance, at least during the first 6 months of storage. During the final storage period, (6 to 13 months) there was, however, a significant average loss in color of 1.7 points for all the samples, and a loss of 2.5 points for the samples containing 100% sucrose (Table I).

It is believed that color deterioration during this period was related to the higher temperatures of the summer months and indicated the need for additional work on controlled temperatures of storage.

Effect of sweetening agents on the color score is presented in Table I and graphically in Fig. 2 and Fig. 3. The data in Fig. 2 indicate that the rate of deterioration of color in the neck of the bottle was significantly retarded when a portion of the sucrose in the ketchup was replaced with either type of corn syrup.

This substitution was statistically significant after 3 months storage and became increasingly effective as the storage period was prolonged. Similar results were noted regardless of type of corn sugar used, or amount of replacement within the limits of 25 to 75%, as indicated in Table I.

The data in Fig. 3 indicate that color deterioration in the bulk of the ketchup likewise was retarded by corn sweeteners, but differences are of much lower magnitude. Overall rate of deterioration in the bulk of the ketchup was much less than in the neck, and color was maintained rather well in all samples during the first 6 months of storage (Table I).

Thus it appears that the effect of corn syrup was limited by the rate of deterioration of color in the bulk of the ketchup and does not preclude the possibility that this agent would become increasingly effective as the storage period is further prolonged. This would result in an increased storage and shelf life of tomato ketchup.

During the course of this investigation, it became of interest to study pigment changes as related to color changes. Therefore, 395 samples from the storage study were analyzed spectrophotometrically for total red and yellow pigments. Transmission values thus obtained were transformed to relative units of 1 to 10 by means of a standard curve.

The results (Table II) indicate that both red and yellow pigments tend to decrease in storage. This trend was found in both the neck and body of the ketchup but was more pronounced in the former. Significant differences between sweeteners were not found. thus indicating that the beneficial effect of corn syrup on color was not related to pigment content.

Further, since both red and yellow pigments decreased during storage, there is no clear evidence that this difference was related to changes in color of the ketchup.

TABLE I—HOW CORN SYRUP RETARDS Color Deterioration of Tomato Ketchup in Storage.

Sweetening Agent	No. of Samples	Months of Storage 1	3	6	13	5% Level
		— Neck Color —				
Sucrose (100%)	126	20.5	19.5	18.4	17.3	...
High conversion syrup*	117	20.7	20.0	19.1	18.9	...
Regular and intermediate conversion syrup*	152	20.4	20.1	18.9	19.0	...
L.S.D.** 5% level		N.S.***	0.5	0.5	0.8	...
Average (all treatments)	395	20.5	19.8	18.8	18.4	0.4
		— Body Color —				
Sucrose (100%)	126	22.8	22.6	22.4	19.9	...
High conversion syrup*	117	23.4	23.0	22.8	21.4	...
Regular and intermediate* conversion syrup	152	22.7	22.7	22.4	21.0	...
L.S.D. 5% level		N.S.	N.S.	N.S.	0.5	...
Average (all treatments)	395	23.0	22.8	22.5	20.8	0.3

* Partial replacement of sucrose with 25 to 75% corn syrup.
** Least significant difference.
*** Not significant.

TABLE II—HOW STORAGE DECREASES Red and Yellow Pigments

Duration of Storage	No. of Samples	Red Pigments* Neck	Red Pigments* Body	Yellow Pigments* Neck	Yellow Pigments* Body
1 month	120	...	9.3	...	8.1
3 months	115	10.4	9.6	8.9	7.8
6 months	117	9.6	8.7	7.7	6.9
13 months	43	8.2	8.3	6.1	7.0
L.S.D** 5% level		0.4	0.2	0.4	0.3

* In terms of relative units of total red and yellow pigments.
** Least significant difference.

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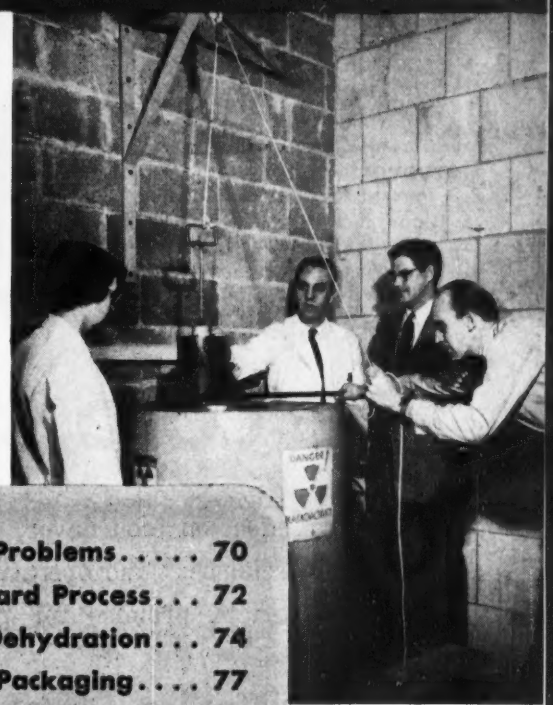
Food Engineering's

MEAT SPECIAL

MEAT SHOW GUIDE

Special Section of FOOD ENGINEERING, September, 1954

Dehydrating meat in high-vacuum ovens.
Making lard by new continuous process.



Atomic sterilization.
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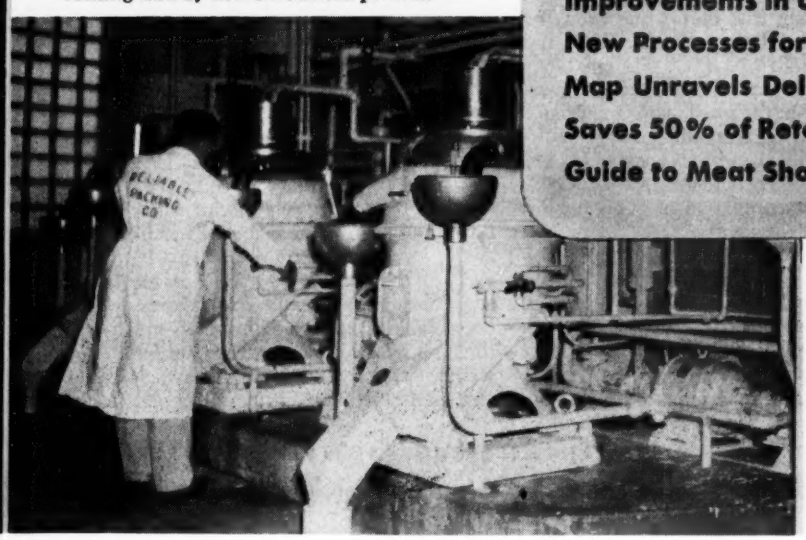
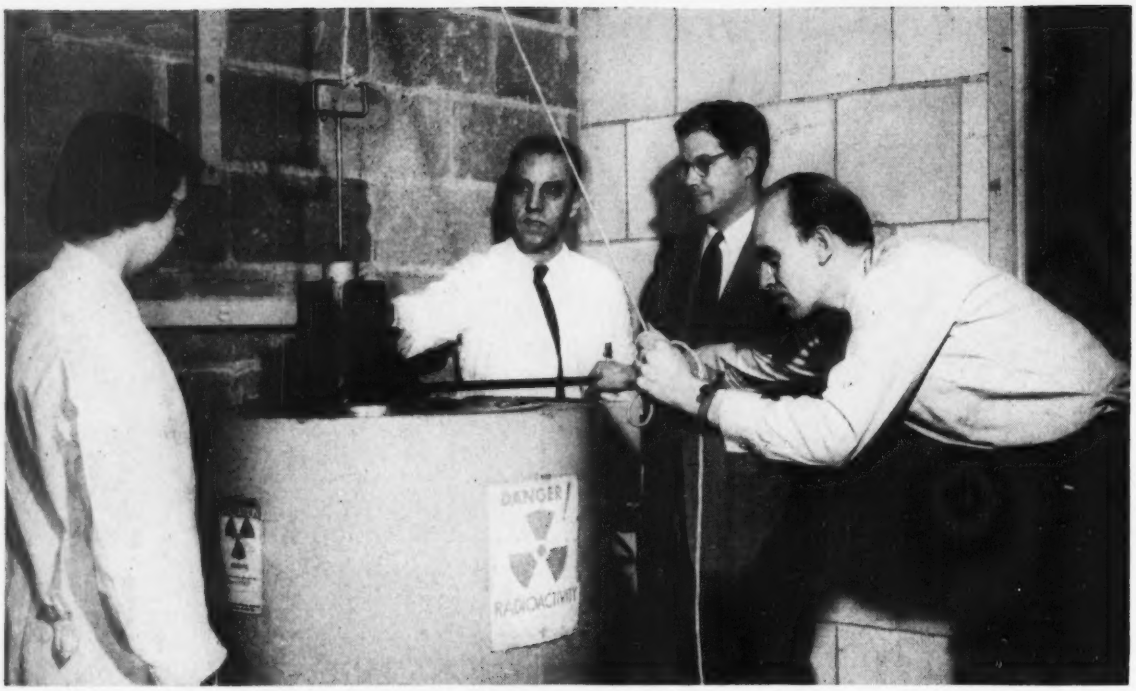




STUDYING sensitivity of spoilage bacteria to gamma rays, researchers illustrate how receptacle that holds meat sample is lowered into sterilizer. Employed in unit is radioactive cobalt supplied by Atomic Energy Commission.

Grappling With the Problems of COLD STERILIZATION

Rays' effect on food flavor, odor, and color are high hurdles on path to commercial use. And operating factors must be resolved . . . but method holds bright promise for prolonging shelf-life of pre-packaged meats

B. S. SCHWEIGERT

Division of Biochemistry & Nutrition, American Meat Institute Foundation, and Department of Biochemistry, University of Chicago

There's definite need for new preserving methods that will permit distribution and storage of food *without* use of refrigeration—while still preventing adverse quality changes associated with existing heat-processing sterilizing techniques.

In this connection, there has been great interest of late in the potential commercial use of radiation sterilization—also called "cold sterilization"—which is achieved with only a small rise in temperature of the product exposed to it.

Many problems, however, must be solved prior to commercial adoption of any new method of processing. This is certainly true of treating foods by radiation. Here, such questions arise as:

(1) How to overcome serious objections to taste, smell, and appearance of the irradiated product.

(2) How to evaluate costs and safety hazards of the process.

(3) Determination of effect on nutritive quality, and

(4) Investigation of possible incidence of harmful substances, either during radiation treatment or subsequent storage of irradiated products.

We will review both the leading problems and the potential advantages of cold sterilization in order to gage the present commercial feasibility of such a process.

First let us indicate the level and kinds of radiation treatments that may be used. *So-called cold sterilization involves irradiating the food primarily by either beta rays (high-speed electrons) or by gamma rays (similar to X-rays), at radiation dosages that assure sterilization of the food—2 to 3 million rep. (Roentgen equivalent physical, the unit of quantity of radiation absorbed by the material irradiated).*

As for comparing radiation dosages and their effects in biological systems, note Table I. *Clearly illustrated are the high radiation dosages required for sterilization of foods and the associated safeguards essential to protect per-*

sonnel from exposure to these rays. From available information, there appears to be a high correlation between biological complexity and sensitivity to radiation injury.

Radiation Levels

The radiation sensitivity varies widely with different kinds of microorganisms and with the metabolic activity. Much higher levels of radiation are required, for example, to kill bacterial spores than vegetative cells. And a sufficient safety factor is required to assure killing of spores in foods.

Population densities and other environmental factors also influence radiation sensitivity of microorganisms. Thus, the sterilization dosage required will vary with the microbial flora and individual characterstics of the foods.

Results to date indicate that both beta and gamma rays are effective in killing microorganisms. There is a major difference, however—

Beta rays do not penetrate as deeply as the gammas (unless there is use of extremely high voltage generators), which makes the betas of primary value for surface sterilization of foods.

Gamma rays have effective penetrating power and, therefore, would be applicable for both surface and interior sterilization of foods.

With the beta ray-producing machines, sterilization dosages (2 to 3 million rep.) are achieved in a matter of seconds. This rapid action, therefore, would be advantageous for continuous food-processing operations. The low penetrating power of beta rays, however, limits the thickness of the product that can be effectively sterilized. By irradiating from both sides with a generator delivering 5,000,000 electron volts,* for example, the maximum thickness of a sample of meat that could be effectively sterilized would be approximately 1 in.

While the beta ray machines can be converted to produce gamma rays, a great loss occurs in power efficiency. X-ray machines may also be used.

* The electron volt is a very small unit used in measurement of energy of nuclear particles—*The Editors.*

Prime C.S. Facts in a Capsule

A radically new processing method for foods—irradiation with beta or gamma rays—is under investigation in a number of laboratories. It's called "cold sterilization" because the product is sterilized with only a small increase in temperature.

Beta rays (high-speed electrons) primarily are produced with high-voltage generators and have limited penetrating power. With generators now in use, maximum thickness of a piece of meat that could be irradiation-sterilized would be about 1 in.

However, gamma rays (from radioactive cobalt or gross fission products from the Atomic Energy Commission) do give effective penetration.

In addition to killing microorganizms, certain undesirable changes in flavor, odor, and color occur in foods during irradiation at sterilization dosages—posing problems that must be solved before commercial application can become a reality.

More promise seems to be offered in the sphere of prolonging the shelf-life of pre-packaged foods—such as meat held under refrigeration—through the use of low-level irradiation prior to storage.

In any event, effective safeguards must be taken to protect personnel from exposure to rays. Thus, installation and line-operation of radiation sources involve important considerations.—*B.S.S.*

Major attention at present has been concentrated on the use of radioactive materials that primarily emit gamma rays. The availability of gross fission products from the Atomic Energy Commission has prompted the Commission to investigate industrial uses for these waste materials. Radioactive cobalt also is available for experimental work.

Sources of Radiation

The experimental cobalt-60 source used by the American Meat Institute Foundation and Food Research Institute at the University of Chicago consists of a hollow cobalt cylinder, shielded by approximately 1 ton of lead. It has sufficient capacity to irradiate approximately ¾ lb. of meat at a time.

Unique about this installation is the fact that the source is refrigerated, and radiation treatments can be carried out at a variety of temperatures. Control of microbial growth by re-refrigeration of the sample also is of great importance, since 18 hr. are required to provide a dosage of 1,500,000 rep.

Radioactive materials lose their potency with time, which is a disadvantage. Radioactive cobalt, for example, will lose approximately 50% of its effectiveness in a 5-yr. period. Such a source of gamma rays, of course, cannot be turned on and off like beta-ray generators.

Mixed beta and gamma rays, produced by nuclear reactors with proper shielding to screen out neutrons or gamma rays from the fission gases, also may be used. With the type of radiation sources indicated and the radiation dosages, it is clear that a wide variety of food products, pharmaceuticals, and other pure chemicals can be effectively sterilized.

"Serious Deficiencies"

Many problems, however, are associated with irradiation of foods and other materials. Experience in our own laboratories, as well as at other institutions, has clearly shown that serious deficiencies occur in the acceptability of the foods with sterilization dosages. With meat, for example, very objectionable off-flavors, odors, and discoloration occur.

Relative susceptibility of different foods to irradiation damage is shown in Table II. For instance, detectable off-flavors and odors are produced in milk and meat with radiation levels

(*Turn to page 147*)

TABLE I—HOW MUCH DOES IT TAKE?
Safe Limits for Man, Lethal Amounts for Insects, and Dosages for Food-Spoilage Elements

SYSTEM	RADIATION DOSAGE (REP.)
Limit of safety for man	0.3 (per week)
Lethal for man	800
Lethal for insects	25,000
Lethal for vegetative bacteria	50,000-500,000
Food sterilization (bacterial spores)	1,000,000-4,000,000
Virus, toxin, or enzyme inactivation	More than 5,000,000

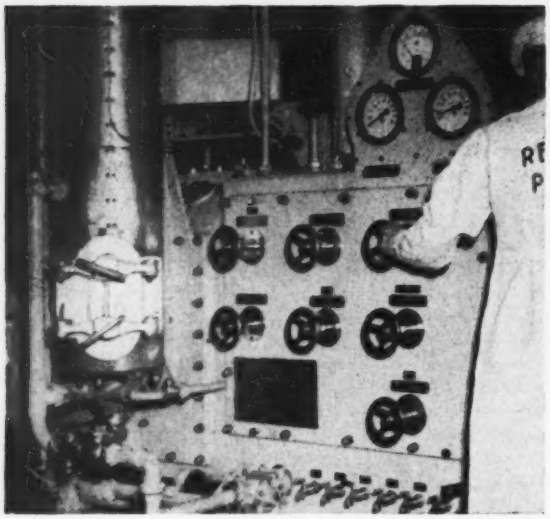
TABLE II—HOW VULNERABLE ARE FOODS TO RAY DAMAGE?
From Most Sensitive Products to Least Sensitive, and Relative to Other Materials

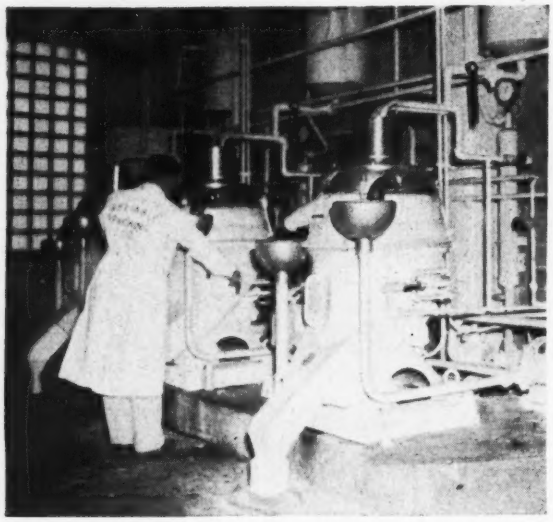
Milk
Meat
Vegetables and Fruits
Pharmaceuticals
Other Pure Chemicals

steam to the deodorizer. The control-

Power requirements per ton of raw

There are six hand-operated regu-





How Process Works

EXPELLER, where first stages of rendering take place in a speedy 3 min., is a combination self-feeding hasher and boiler. Rendered fats subsequently are strained and pressed, ready for separation.

STRAINED EMULSION goes to these three continuous centrifuges. First two separate fat from water and sludge. Third clarifies the fat. Complete operations through clarification takes about 10 min.

MAKES QUALITY LARD

By Continuous 2-System Setup

Reliable of Chicago astutely teams Danish-developed units (for rendering, straining, pressing, separating, clarifying) with its own highly efficient installation (for deaerating, blending, filtering, deodorizing, chilling, plasticizing). . . . Straight-through line handles 2,800 lb. of product hourly

JOHN E. THOMPSON

President, Reliable Packing Co., Chicago

Pre-war consumer preference for colorless, odorless, tasteless, high-smoke-point shortenings put rendered lard in the back seat.

But now lard has made a comeback.

To review the old plight of the renderers: If their plants were not federally inspected, they were in a bad selling position—being forced to dispose of their product as a price far below that of loose lard.

Moreover, lard's poor reputation created an adverse effect on meats, with consumers unjustly questioning meat quality.

Naturally, we had to do something about this situation. And we did.

Today, the quality of lard is comparable to — and the product competitive with—hydrogenated vegetable shortening. Process-wise, renderers have improved their techniques and slashed operating time to strengthen themselves in the shortening market.

How Quality Was Put In

To give ourselves a fighting chance, we surveyed rendering operations throughout the country—studied techniques and evaluated lard quality. In contrast to present knowledge, we found that little was understood about lard rendering. And that quality was no match for vegetable shortenings. Lard was primarily used as a bread ingredient.

Now it is possible to render, alkali-refine, bleach, hydrogenate, deodorize, chill-plasticize, and treat with anti-oxidants or emulsifiers. Not only do antioxidants prolong lard's keeping quality, but they also extend shelf-life of food products made with such lard. Another good thing: Melting point of lard now can be raised 10-15 deg. F. by adding 4-8% hydrogenated lard flakes.

During this period, we at Reliable continued dry rendering, making advances along the way that helped to better lard quality.

One improvement involved installation of a continuous, high-vacuum, high-temperature deodorizer to produce a lard with a high smoke point. Employed is a brandy still that is supplied with the 425-deg.-F. fat from a heating unit (Dowtherm). Our company-developed deodorizer operates under a 29.9-in. vacuum, pulled by a three-stage ejector.

Success was achieved through use of a controller (Ratio-Flow), along with measuring means (two Rotameter pickups) for gaging fat and

steam to the deodorizer. The controller automatically proportions steam-to-fat flow. Static level in the discharge section is automatically regulated by a unit (Leveltrol) that operates outlet and inlet valves.

Hot lard from the heating unit passes downward in the deodorizing tower, which is fitted with a series of trays and bubble caps. Stripping steam enters at bottom tray, meeting countercurrent-flowing lard. Rising in the tower, the live steam picks up odoriferous constituents, without chemically reacting with the lard.

Soon after, we looked into the Titan expulsion system for continuous lard making—from hashing through deodorizing. This process, extensively used in Europe, especially in Denmark where it was developed in the middle 1930's, employs a grinder-renderer, rotary screen, screw press, and centrifugals.

Samples of this processed lard that had been shipped to us looked good, and encouraged us to visit installations in Denmark. When compared with steam and dry rendering units in that country, merits of the system were justified.

One thing we particularly noted—the type of raw material that was being rendered. Danes use far less cutting fats than we do.

However, with modifications—enlarging the rotary screen and screw press and retaining most of our "tail-end" rendering units—we devised a combination of the Danish system and our own process to turn out a superior quality lard that is a match for vegetable shortenings.

We had found that Titan lard was not bland enough. Use of the continuous deodorizer was, therefore, necessary, particularly in blending refined oils to produce shortenings. Units retained from our own system were the deaerator, blender, filter, continuous deodorizer, Votator chiller and plasticizer, and packaging lines.

Our continuous lard-rendering system is now geared to handle trimmed fats from a 220-hog-per-hr. kill.

10-Min. Throughput

Continuous lard rendering by the expulsion system involves the economical, efficient use of direct, high-temperature steam, followed by a sharp pressure drop.

Once the system is running at full capacity (start-up time 12 min.) the operation—through final clarification—is completed in about 10 min.

Present installation takes up only about 650 sq. ft. of floor space, and handles about 2,800 lb. of raw fat hourly. What's more, only two men are needed to run it.

Power requirements per ton of raw material amounts to 775 lb. of steam (at 85 psi.) and 23 kw. of electric power.

Average yield from raw material is 99.5% of fat—a 2-3% increase over pressure-tank rendering—with a free fatty acid content of 0.08-0.16%. Recovered fat has a good color and flavor. Retained tissue is semi-dry, highly nutritive, and readily dried for feed.

Rendering Details

Impressive is the rendering portion of the system. We are belt-conveying pork fats from our hog-cutting lines to a chopper with claw-type knives. Ground to uniform size, fats are then continuously charged into the feed hopper of the sturdy, compact expeller portion—actual rendering unit—of the process.

The expeller (called "expulser" by the developers of the system) is driven by a 25-hp. motor. Average horsepower needed is about 15, but the additional hp. is available in event of sudden peak-power requirements. This portion comprises a mincer, with feeding device and knives, pre-heater, and pressure boiler.

YOU'LL FIND a graphic overall picture of Reliable's topflight lard-rendering system in this month's FE Picture Flowsheet, "Unit Line-Up for Making Superior Lard." It's on pages 102-105.

Piped hot water is introduced along with the fats charged into the feed hopper. At the bottom of the hopper, a shaft-driven impeller feeds the watered, ground fat to the horizontal hasher. Mincing takes place as a feed screw carries the material past a series of shaft-driven cross knives that cut against pre-cutters and aperture plates.

Hashed fats now continue through a connecting tube on the way into a horizontal pre-heater—a horizontal cylinder with an internal helical conveyor. Here, water and steam are introduced to raise the temperature to 180 deg. F. and to form the raw material into a pulpy mass.

From pre-heater, a high-speed pump charges the mashed material into the vertical pressure boiler for direct steam heating to 240 deg. F. Formed during this short, but effective, boiler treatment is a homogenous mixture of fat, tissue, and freed water.

Boiling pulp is next discharged through a reducing valve, and blown off into the cyclone that is hooked up to a condenser to remove steam vapor from the room. This sudden pressure drop completes separation of fat from tissue.

There are six hand-operated regulating valves on the front of the expeller for: (1) Heat to pre-heater, (2) main steam supply, (3) steam to cutters, (4) heat to pressure boiler, (5) water, and (6) steam to built-in pre-heater.

From cyclone, boiling pulp drops through a 2-in. pipe into the ¾-hp.-driven rotary strainer, with a helical screw and three interchangeable screens. Solids retained by the strainer are directly chuted into the chain-driven 2½-hp.-driven screw-press, with a resiliently operated valve at discharge end.

The emulsion from the screw-press is returned to the cyclone for recovery of additional fat. Meanwhile, the fat emulsion passes through the strainer and into an accumulating tank.

Separating and Clarifying

The emulsion is now forced through a tank (contact emulsifier) in which it is deodorized with live steam (212 F.). It then continues to the conditioning tank, where fat and water are ready for separation.

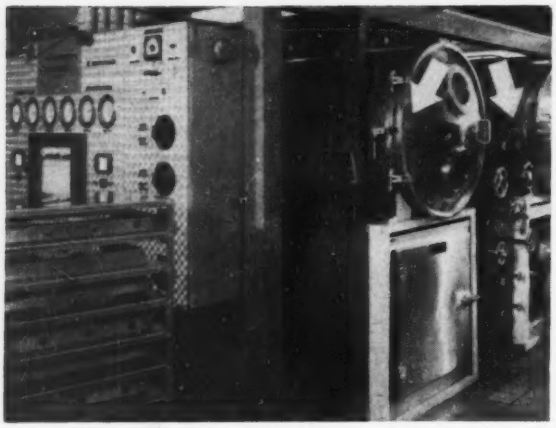
Self-cleaning, three-phase (fat, water, and sludge), centrifuge-type separators recover and clarify the crude fat. Sludge deposited in the centrifuge bowls is intermittently discharged, without stopping the machines or interrupting the process.

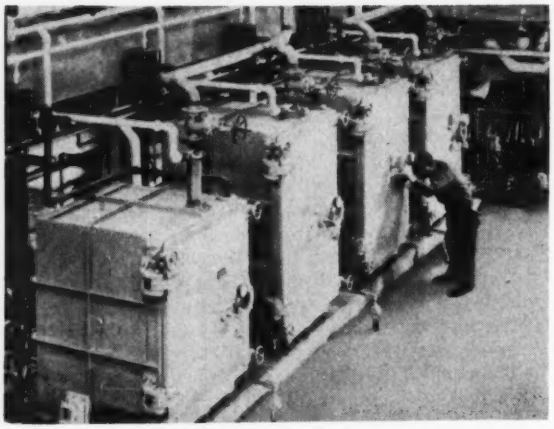
Working in parallel are the three separators, each driven by 10-hp. motors. The first two, with disks spaced 2 mm. apart, recover the fat. After separation in the second centrifuge, the lard passes through a second contact emulsifier. Lard is then clarified in the third centrifuge, with disks spaced 0.75 mm. apart. It then goes into the fat tank.

From here on, the process is essentially ours. Lard is check-weighed in a 6,600-lb. rectangular scale tank. Next, the lard is pumped into a 16,000-lb. capacity deaerator, where it is held under 20 in. of vacuum for 15 min.

Deaerated lard continues into a 14,500-lb. capacity blending tank, then goes into a 2,000-lb. capacity mixing tank having a vertical-type propeller agitator. Treated with filter aid, the lard is then filtered, under 15-20 psi. pressure and fed into two 6,000-lb. capacity storage tanks.

At this stage, the lard goes to the continuous deodorizer (previously described) and then into final holding tanks (there is one of 28,000 lb. and two others of 15,000 lb. each). Lard finally is chill-plasticized in a Votator type, mixer and heat unit. It is then put up in 380-lb drums, 50-lb. tins, 3-lb. cans, and 1-lb. cartons.





DRYING OF MEATS was carried out experimentally in these units at the Armour's new pharmaceutical center near Kankakee, Ill. Left: Plasma dryers (arrows). Right: Vacuum ovens.

Progress in Meat Dehydration

Much research still needed, but results to date show promise. Cost of freeze-drying may be comparable to that of canning. Flavor and texture of dehydrated meats more nearly approach that of fresh than the canned

H. P. FURGAL
Research Division, Armour and Company, Chicago

That monumental problem of packing houses – meat preservation – has stimulated constant search for more efficient means to produce more stable foods.

Thus, useful holding time of meats and meat products would be prolonged.

Today, there are looming on the food horizon two methods that may become salient. One, of course, is radiation sterilization. Our spotlight here is on the other: Drying by sublimation (freeze-drying).

Actually, freeze-drying has been used over 50 years in the biological sciences, specifically for preservation of unstable products. Fundamentally, it consists of removal of water under high vacuum by sublimation from the solid phase (ice) into the gaseous phase (water vapor).

It is well known that the boiling point of water can be lowered by reducing the air pressure. Hence, under reduced pressures, the rate of evaporation of water is increased.

Evaporation is a cooling action. When pressures of less than 1,000 millimicrons (1 mm. of mercury) are reached, evaporation is so rapid that both the product from which water is being removed and the water left in the product freeze, and evaporation takes place directly from the solid phase (ice) without going through the liquid phase. Heat can be introduced in the latter stages of drying in order to speed water removal.

Numerous Benefits Seen

There are four advantages of this method, when considered for so unstable a product as meat:

1. Low temperature–Sub-freezing temperatures retard chemical, enzymatic, and bacterial activity. (Meat denatures on heating, causing chemical rearrangement to take place, thus altering flavor and making rehydration difficult.)

2. No case-hardening–Since evaporation is directly from the frozen state with no liquid migration to the surface, a highly porous dry residue is left. In this way, lower moisture levels are possible, hence greater stability and greater ease of rehydration.

3. Little loss of volatile components–Since many volatile components decrease in vapor pressure at a greater rate than water, only small amounts of these valuable flavor and odor components are lost, even under high vacuums used.

4. Sterility–Chemical, enzymatic, and bacterial activity is practically nil at low temperatures employed during freeze-drying. Low residual moisture prevents these reactions from resuming when the temperature is varied during the final drying stage.

Some of the many excellent articles and texts that have been written on the energy relationships and other theoretical aspects of freeze-drying are noted in our bibliography (end of article). We will consider experimental data–

Beef steaks (U. S. Choice, and U. S. Commercial grade) and pork chops (¼ in. thick and of 3 to 4 in. dia.) as well as bulk and patty hamburgers have been laboratory-dried utilizing three types of equipment:

Plasma Dryer — Here, moisture is condensed on refrigerated coils within the unit. Vacuum is generally produced with the aid of vacuum pumps, and heating is by two sets of platinum alloy wires that give off infra-red heat at two different wave bands. In this equipment, it is possible to obtain a vacuum of approximately 200 millimicrons (0.2 mm. of mercury).

Of all equipment, this is probably the most costly in terms of initial installation. Then, too, serious limitations on capacity (because of complicated construction features) further tend to raise costs.

Stokes Oven—In this large cast-iron oven, moisture is swept out and vacuum produced by a four-stage steam

ejector. Heating is accomplished by passing hot water through the hollow shelves. It is by conduction only and, therefore, product should be in direct contact with the plates for best results.

It was possible to obtain a vacuum of 500-700 millimicrons (0.5 to 0.7 mm. mercury) in this unit. Generally, drying was slower in this oven than in others used. However, original cost is probably considerably lower because of relative simplicity of design.

Refrigerated Drying Oven — Vacuum was produced in this cylindrical oven by oil pumps. Moisture was condensed on refrigerated coils located within the unit. Oven was equipped with hollow shelves to provide for circulation of hot water or steam, hence heating was by conduction. Approximately 300 millimicrons (0.3 mm. of mercury) vacuum was obtainable.

All this equipment is more or less standardized and obtainable on the market.

High vacuum produced in the chambers causes extremely rapid moisture loss. This fast evaporation quickly cools the product and so, strictly speaking, it would freeze during the drying operation.

Pre-Freezing

However, in our experiment, all product was pre-frozen externally in a dry-ice chest and by mechanical refrigeration at −10 F. and −30 F. There was thought to be some advantage in pre-freezing at very rapid rates in that small ice crystals would form and thus little damage would be done to the structure of the tissue. In some cases, product was obtained and cut up several days prior to the drying. Thus, pre-freezing aided in retarding bacterial activity.

No difference in color, keeping quality, or flavor of the finished product could be attributed to variations in handling during pre-freezing—as far as our limited tests revealed.

Experimental drying ranged from 8 hr. in the plasma dryer to a maximum of 72 hr. in the large Stokes ovens. Latter time was found to be greatly in excess of the drying time actually needed. Table I shows final moisture content of various products dried for several time-temperature combinations.

These figures should be taken as approximations only, since variations of 2-3% were not uncommon in product dried at one time.

In several experiments, product temperature was measured during drying. Our graph presents records obtained by potentiometric measurements through thermocouples imbedded in the meat.

Reviewing the Road to Freeze-Drying

Drying of meat to preserve it harks back to prehistory. It probably was hit upon accidentally and well may have antedated the discovery of fire.

The American Indian used to expose meat to the combined effects of sun and wind. This method was not very efficient. It did not yield a product which, in any way, could be said to resemble fresh meat, since it was usually dry and leathery.

Technological advance replaced sun and wind with the warm-air oven, which was able to accomplish the same thing as the natural elements but faster and with more possibility for control and absolute freedom from the variability of climate.

During World War II, the U. S. Army's ration complement supplied two dehydrated meat items—meat-and-rice and corned beef hash. Relatively short shelf-life and low palatability caused these products to be dropped from the ration list at the close of the war.

The dehydrated meat bar, consisting of comminuted dried meat with added fat worked in, was a later product of the QM Food & Container Institute and a meat packing company.

None of these products rehydrated very well, nor did they possess some of the other texture and flavor attributes that make fresh meat so desirable.

It soon became apparent that it would be difficult, if not impossible, to produce by means of the warm-air oven a dried meat product that would rehydrate well. And at this point there were initiated extended investigations into the use of freeze-drying or drying by sublimation.—*H.P.F.*

Previous tests have shown that a final moisture content of 2%, or less, is necessary for stability of finished product with regard to resistance toward bacterial, enzymatic, and chemical activity. From the figures presented it could be said that 48 hr. in the vacuum chamber with a maximum plate temperature of 120 F. produces a product with satisfactory final moisture content.

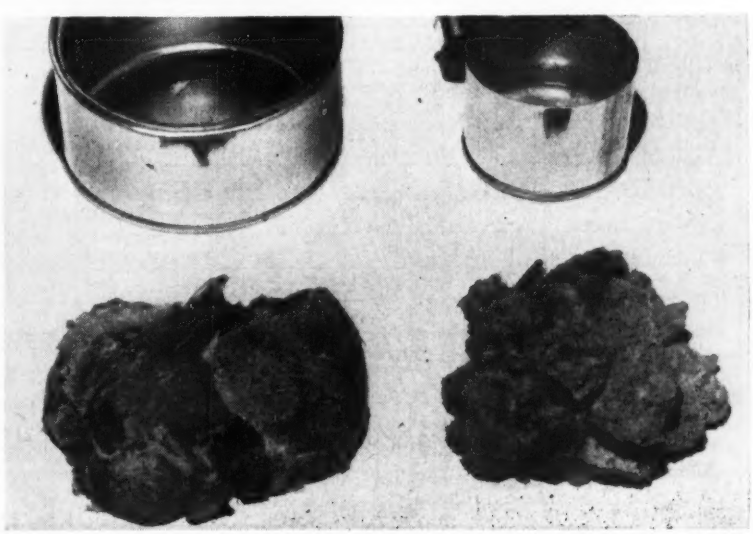
In all cases, temperature was kept at 120 F., or lower, because higher temperatures are apt to cause extensive heat denaturation.

Pre-cooked steaks and hamburger were also tried. But they rehydrated poorly and generally had inferior flavor and keeping properties.

After drying, the meat was put up either in flexible packages or cans. It was found that a vacuum was necessary, since packaging without evacuation of the container resulted in product in which flavor and ability to rehydrate deteriorated rapidly.

Flexible packages tried were of the transparent-film and laminated-foil type. Neither proved satisfactory. Big problem in packaging of steaks in the flexible film was bone puncture. However, since only two types of flexible film were tried, it should not be concluded that flexible packaging of dehydrated meat is not possible.

By far, the best storage results were with product stored in evacuated cans. Previous sterilization of the cans was



OUT OF the cans, ready for rehydration. Left: Steak. Right: Hamburger.

Meat Drying and Rehydration Data

TABLE I—RELATION of Time, Temperature, and Vacuum to Final Moisture Content of Various Meats

PRODUCT	DRYING TIME (Hr.)	MAXIMUM OVEN TEMP. (Deg. F. & Time)	VACUUM (Millimicrons)	MOISTURE (%)
Steak	27	105°/12 hr.	500–700	2.6
Hamburger	24	105°/18 hr.	500–700	4.0
Steak	24	105°/18 hr.	500–700	6.0
Hamburger patties	72	100°/48 hr.	300	1.9
Steak	72	100°/48 hr.	300	1.7
Pork Chops	72	100°/48 hr.	300	2.5
Hamburger	60	95°/50 hr.	300	1.2
Steak	60	95°/50 hr.	300	1.5
Steak	48	120°/40 hr.	300	1.0
Steak	24	120°/16 hr.	300	2.1

TABLE II—REHYDRATION-WEIGHT GAIN of Dried Steak in Excess Water

TIME (Min.)	WEIGHT (Grams)	GAIN OVER PREVIOUS WEIGHT (Grams)	% OF ORIGINAL WET WEIGHT
0	24.85	...	19.38
4	71.85	47.0	56.04
8	81.63	9.78	63.69
12	85.70	4.07	66.85

unnecessary. A vacuum of 20-28 in. was generally satisfactory.

The dried product did not change noticeably in bulk. Immediately after removal from the vacuum chamber, the product color ranged from dark red to medium red-gray. This gray tinge became more pronounced when the product was allowed to stand in air—probably due to formation of metmyoglobin (meat pigment in which iron in the heme is fully oxidized).

The product was generally packaged 30 min. to 1 hr. after completion of drying. Texture of the dried product was like that of hemp, and a very slight whey-like odor was noticeable.

Rehydration Details

Freeze-dried meat was rehydrated by immersing in tap water. Temperature of the water, within the limits of 70-100 F., seemed to have little effect on rate of rehydration. Table II presents the figures obtained from rehydration of a steak in an excess of 75 F. water.

The steak had a fresh weight of 128.2g. Hence, this sample regained 58.9% of the water it lost.

Course of Temperature Changes During Drying

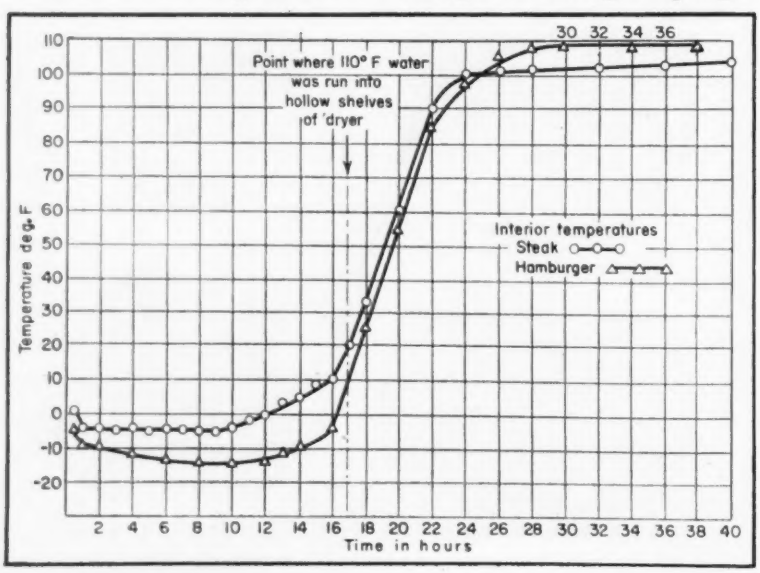


TABLE III—MOISTURE ABSORPTION in Air (Steak)

TIME ELAPSED (Hr.)	MOISTURE (%)
0	1.35
18	10.14
72	14.35
96	14.10

During rehydration, the meat color often changed from red to gray. The water had a bloody appearance.

Moisture absorption in air was studied simply by exposing a dehydrated steak to air at 71-73 F. and a relative humidity of 50%. Table III shows the weight-gain in one such experiment. And the figures indicate the need for a moisture-proof wrapper.

Texture of the meat after rehydration was very good, hence very similar to that of fresh meat. About 20-30 min. of immersion in water sufficed for rehydration. Some of the normal fresh meat odor returned during rehydration. Normal meat odor was present during frying.

The meat seemed to fry up fairly well, but a bloody exudite could be detected. It was also possible to produce the brown crust typical of fried meat.

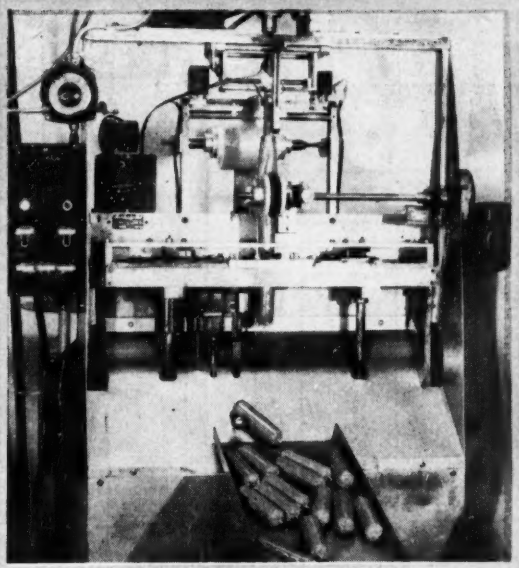
Dried meat was stored for periods ranging from one month to two years at 70-74 F. Ability to rehydrate was somewhat adversely affected after prolonged storage. With passage of time, the whey-like odor became more pronounced. Tests were not critical enough to permit us to say whether off-flavor development is measurably associated with the increase in whey-like odor.

Palatability of the dried steaks, pork chops, and hamburger greatly varied. Though generally easily distinguished from fresh meat in flavor and to some extent in texture, some steaks were still entirely acceptable at the end of 10 months' storage. They were juicy, free from off-flavors, and fresh-meat-like in flavor to an appreciable extent. Pork chops were found to be palatable for 6-month periods.

Hamburger dehydrated in bulk fared best of all. Sampling at the end of two years' storage indicates that it possesses acceptable flavor, although the texture is somewhat woody. This woodiness is a characteristic of most dried meats and detracts somewhat from their acceptability. No doubt some of the flavor leached out during rehydration.

► **Although no estimates are available regarding the cost of this product in commercial production, theoretical-**

(*Turn to page 152*)



Latest packager . . . **. . . and its packages**

Self-contained "plant" (left) forms and fills pouched products non-stop—and in varying sizes (right).

Makes Chub Items Continuously

—Minus Those Labor-and-Time Headaches

New machine automatically forms, seals, and fills with exact amount of meat, then aluminum-clip-seals ends of packages . . . Rate: 30-plus per minute . . . Other uses seen

FE STAFF

Most meat packers putting up chub-type items—sausage-meat products and sandwich-meat spreads—spend a lot of time and manual labor doing it.

Each casing must be hand-string-tied at one end, slipped over the feed end of a volumetric alternating-type filler attached to a stuffer, and filled with meat product. Then the other casing end must be string-tied and excess string and casing cut off.

And that's a lot of work!

But when some packers saw how much money they were losing in this almost totally manual packaging operation, they decided to invest a little time in figuring out a better way to put up chubs.

A check among equipment manufacturers speedily revealed that there was no machine on the market to do the job both automatically and continuously.

What made the job doubly difficult in one instance was the protective packaging material, saran, selected by a meat packer for chub-type items. Saran is extremely difficult to seal by conventional methods. Bar-type heat-sealers, for example, could not be employed because of the film's extremely critical sealing temperature.

Special Unit Built

Ultimately, with extensive researching and developing, a unit was built by Kartridg-Pak Machine Co., of Chicago, for continuous, saran-film packaging of chubs at minimum rate of 30 per min.

First unit was installed at the Oscar Mayer Co., Madison, Wis., plant. Soon after, Oscar Mayer broadened the application of this new machine for chub-packaging of cookie doughs. ▶ **Foreseen, too, are other, across-the board food-industry applications for such items as cheese spreads, fudge, chili, meat sauces, and a host of other products.**

Like Kartridg-Pak's other machines —for stripping cellulose casing from wieners and for paper-banding franks in a cartridge-like strip— this chub-packer is available to the food industry.

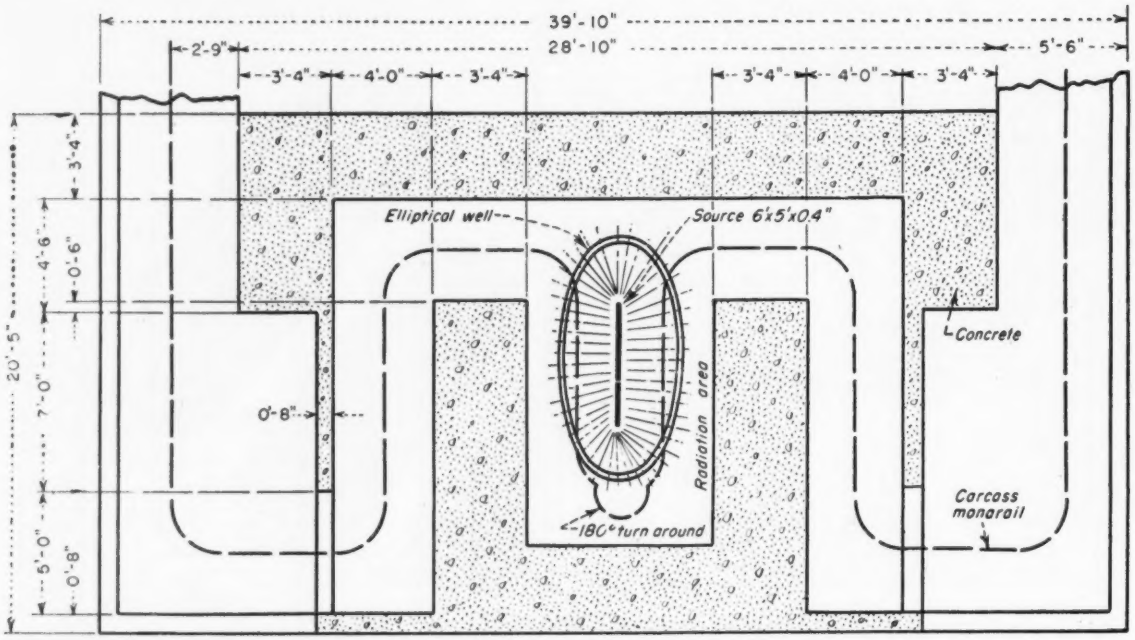
How Machine Works

Sausage-meat products and sandwich-meat spreads are packaged by this new machine in 4-, 6-, 8-, 12-, and 16-oz. units. Package sizes range from 1¼ to 3¼-in. dia. and 3 to 9-in. length.

The new chub-packaging machine is hooked up to a pressure-type sausage-stuffing unit, with a 2-in. stainless steel pipe and sanitary fittings. Pressure applied at the stuffer varies with the type of product being handled.

Naturally, the more viscous-type products like sausage meats require higher stuffing pressures than the less

(*Turn to page 154*)



CHAMBER for irradiation of pork carcasses by radioactive fission products, at rate of 2,000 hogs daily (plan view).

DESIGN FISSION IRRADIATOR To Break Trichinosis Cycle

Would employ gamma rays from radioactive elements or waste fission products. Cost calculated at 2.13 mills per pound of meat, in 2,000-hog-per-day plant

H. J. GOMBERG, S. E. GOULD, J. V. NEHEMIAS and L. E. BROWNELL

First two authors are with Michigan Memorial-Phenix Project 54; latter two are associated with Fission Products Laboratory, Engineering Research Institute, University of Michigan, Ann Arbor

Ionizing radiation can be used to break the trichinosis cycle in pork carcasses at a calculated cost of only 2.13 mills per pound, or 29¢ per 135-lb. carcass.

This figure is based upon a 2,000-hog-per-day operation, and upon handling and irradiating methods worked out on a design basis to be readily adaptable to the conventional meat plant.

The technical feasibility of using ionizing radiation for this purpose already had been well established,* but the economic aspects had not been thoroughly explored.

A radiation dose of 15,000 rep. (Roentgen equivalent physical) will sterilize trichinae encysted within the hog carcass so that they cannot reproduce and cause infection. And the irradiation level used in this cost study is 30,000 rep. to the surface of the meat. This dosage produces 25,000 rep. at the center of a 14-in. carcass, and the thickest sections, the hams, rarely are more than 10 in. thick.

Flavor of the meat is not affected by this amount of radiation. Flavor tests with ground pork show no detectable taste changes with doses up to 60,000 rep., heavy enough to destroy microorganisms and double the shelf-life of meat. Even a 30,000-rep. treatment lengthens shelf-life almost 30%.

In exploring the economics of treating meat against trichinae, the mechanics of the operation have been planned and the source of the gamma irradiation selected.

The plant was designed to irradiate the 2,000 carcasses in the 24 hr. minimum delay between carcass preparation and cutting. And for convenience and access to the chill room, the irradiation unit is designed to operate at the second story level.

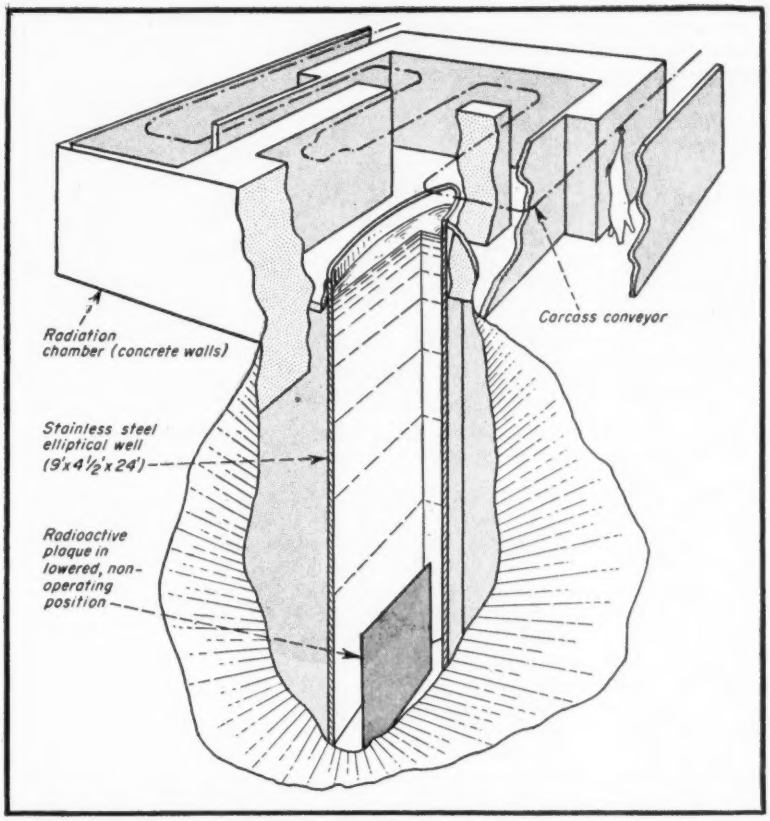
To provide a broad uniform radiation field through which the carcass passes, the irradiation source takes the form of a plaque 5 ft. wide and 6 ft. high. The radioactive material would be either cesium-137 or waste fission products.

Design of Source

There are many shapes and types of containers which might prove suitable for holding concentrated radioactive fission products.

Cylindrical containers are simple to fill and are strong. The big advantage of strips is the reduced number of source pieces required. A rectangular

* H. J. Gomberg, S. E. Gould, J. V. Nehemias, and L. E. Brownell, *Nucleonics*, Apr. '54.


Radiation chamber (concrete walls)
Stainless steel elliptical well (9'x4½'x24')
Radioactive plaque in lowered, non-operating position
Carcass conveyor

PERSPECTIVE view of chamber showing well for radioactive plaque.

strip can be used to irradiate samples on either side, and it presents a continuous, uniform plane from which rays are emitted. This is advantageous in irradiating food conveyed by mechanical means through a chamber. It is desirable to introduce a minimum of direction changes, preferably with no change in conveyor mechanism.

Preliminary calculations indicate that it is not feasible to use cylindrical source rods at 2-ft. intervals. Rods so spaced must be unduly large if a high radiation flux is desired. Source rods of large diameter are undesirable because self-absorption of the radiation causes generation of heat in the rods.

The alternative is to use shorter intervals between the rods. This process can be continued until the limit is reached, at which the rods are adjacent to one another. Then the rods form a plaque for purposes of flux calculations, and a very large number of rods would be required.

Therefore, the calculations are based on designs involving the use of a plaque made up of plane strips.

Design of Radiation Chamber

Using the single 6 ft. x 5 ft. x 0.4 in. plaque, 2,000 hogs can be irradiated each day by bringing the hogs on a conveyor past both sides of the plaque. The flux at 21 in. is calculated to be approximately 13,500 rep. per min. Therefore, the necessary time for the pork to accumulate 30,000 rep. will be 2.1 min. in the radiation chamber, and the pork should be conveyed at a speed of 6.67 fpm.

The amount of radioactivity required is calculated to be 1.5 megacuries. This amount of cesium activity would require 3 ft. 4 in. of concrete shielding if placed above grade.

Alternative designs are feasible in which the radiation chamber is placed one story below grade or one story above grade. There are some advantages and disadvantages for each location. Placing the radiation chamber below grade would reduce the amount of concrete shielding required. However, this advantage is partially offset by the additional cost of excavation and the requirement of steel reinforcing for retaining walls, waterproofing, or installation of water sump pumps, etc.

Placing the radiation chamber on the floor on which the pork is being handled eliminates the need for an inclined conveyor or an elevator.

In the design proposed, the radiation well and chamber are both placed above grade, with the radiation chamber at the level of the second floor.

Although a radiation chamber is essentially a room with thick walls of concrete, the cost of the concrete is not a large part of the total outlay. It is estimated that the concrete for shielding would cost in the range of $30 to $50 per cubic yard for poured concrete, including the cost of forms. The expense would be slightly higher if the structure is formed of solid concrete blocks, with mortar joints, because of the additional cost for masons.

It is estimated that a suitable radiation chamber of the type illustrated might be constructed for a total of $58,000, not including the outlay for the radiation source itself, or shipping and installation charges. Cost estimates are given in Table I.

To date there is not sufficient information to gage reliably the cost of packaged fission products. However, an estimate may be made of the magnitude of the cost of the fission products, using the 0.6-power scaling factor frequently employed in estimating the costs of chemical plants.

Kilocurie gamma sources of cesium-137 processed from fission products can be supplied by the Radioisotopes Division of the Atomic Energy Commission, Oak Ridge, Tenn., for $5,000. The experience of the Fission Products Laboratory with a 1,000-curie cobalt-60 source indicates that shipping (700 miles) and installation charges (not including the cost of the shipping container) would total about $1,000.

Therefore it is assumed that $6,000 is a reasonable installed cost for 1,000 curies of cesium-137. Using the 0.6-power factor** for scaling up to 1.5-megacurie source, the installed cost is estimated to be:

$$X = \$6{,}000\left(\frac{1{,}500{,}000}{1{,}000}\right)^{0.6}$$

$$= \$483{,}000.$$

Another approach to estimation of costs may be made on the basis of prices for cesium-137 therapy sources, which are now $100 for the first curie and $25 per curie for additional activity. Employing the same scaling-factor approach for transition from small- to large-scale operations and using a base price of $100 per curie, 1.5 megacuries would run to $507,600. On the same basis with a $50 base cost per curie, the total would be $253,800. For the $25 base cost, the total would be only $126,900.

A third approach to price was made with the aid of experts*** in the field of uranium processing. It is estimated that through the use of

** C. H. Chilton, "Six-Tenths Factor Applies to Complete Plant Costs," *Chem. Eng.*, 57, No. 4, Apr. '50.

*** Private communication from Dr. Harold Ohlgren, formerly chief engineer of chemical processing plant, Idaho Falls, Ida.

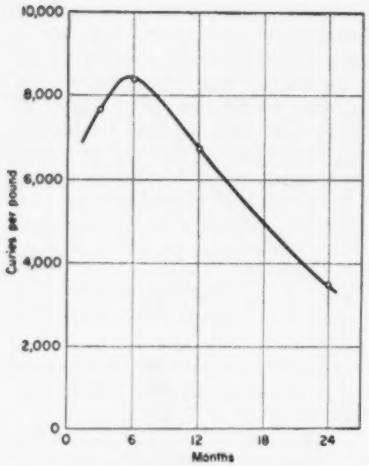


FIG. 1—Gamma specific activity in curies per pound as function of age for mixed fission products.

modern large-scale techniques, cesium-137 can be separated in megacurie amounts for about $0.30 per curie. Then a 1.5-megacurie source would be $450,000.

Considering the range of values obtained from these varied approaches, it is felt that the value chosen, $483,000, represents a reasonable estimate.

A shipping container for such sources might be supplied by the Atomic Energy Commission or an industrial handler of fission-product sources. If not, a steel-reinforced lead container, approximately 2x7x8 ft., would cost $25,000. This container would weigh about 50 tons and therefore could be shipped on a flat car. A much cheaper but more unwieldy container could be constructed of concrete.

Estimated Cost

The cost for a radiation chamber on the second floor, including the outlay for a lead shipping container, is estimated to be:

Radiation chamber...	$58,000
Shipping container...	25,000
1.5-megacurie source, installed	483,000
Total	$566,000

From an analysis taking into account these factors—wages and salaries, operating costs, overhead, taxes, interest, insurance, and depreciation and obsolescence (10 yr.)—the annual cost of plant operation is placed at $149,700.

Based on 1950 production figures, 68,504,000 head of hogs yielded 9.265 million pounds of pork; thus, the average hog yields 135 lb. of pork, excluding lard. Basing the design on a rate of 2,000 hogs per day and operation 260 days per year, the plant production would be:

(2,000 hogs/day) (260 days/year) (135 lb. pork/hog) = 70,200,000 lb. of pork/year.

Cost of operating the irradiation chamber to be added to the price of pork would thus be:

$$\frac{\$149,700/\text{yr.}}{70,200,000\ \text{lb./yr.}} = \$0.00213/\text{lb.}$$

$$= 2.13\ \text{mills/lb.}$$

or . . .

($0.00213/lb)(135 lb./hog) = $0.29/hog.

An alternate method of plant financing — based upon a system of cesium-source rental and taking the long half-life of cesium realistically—

(*Turn to page 154*)

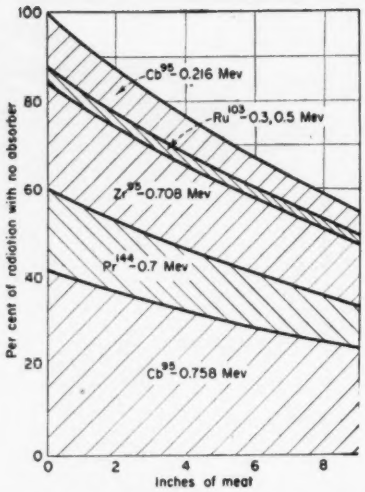


FIG. 2—Absorption in meat of gamma radiation from mixed fission products six months old.

TABLE I—COST ESTIMATES for Radiation Chamber for Pork (Designed to handle 2,000 hogs per day).

Excavation for footings and shoring	$ 600
Stainless-steel well (elliptical: 16 ga. x 9 ft. x 4 ft. 6 in. x 24 ft.	2,500
Forms for concrete walls of radiation chamber (9,000 bd. ft. at $100/M)	900
Concrete for walls (320 yd. at $20/yd.)	6,400
Labor for forming and pouring walls	6,200
Forms and reinforcing for roof	150
Concrete for roof (50 yd. at $20/yd.)	1,000
Labor for forming and pouring roof	800
Concrete for floor (5 yd. at $20/yd.)	100
Reinforcing and labor for floor	200
Use of crane to raise concrete to second floor	600
Elevator mechanism	2,500
Ion exchange for well water	3,000
Monitoring equipment	4,000
Wiring	200
Water lines and labor for pipe fitting	800
Access doors (with safety interlock)	1,200
Ventilation system	2,000
Refrigeration lines	4,000
Backgrading	200
Painting	250
Conveyor mechanism in radiation chamber	3,200
Conveyor mechanism to and from refrigerator room	3,200
Subtotal for labor and materials	44,000
Miscellaneous contingencies (10% of subtotal)	4,400
Engineering costs (5% of labor and materials)	4,400
Contractor's fee (10% of costs)	5,200
Total	$58,000

[1]H. F. Hunter and N. E. Ballou, "Fission Products Decay Rates," *Nucleonics*, Nov. 51. [2]National Bureau of Standards, Handbook 499, *Nuclear Data*.
[3]L. D. Marinelli, Quimby, and Hines, "Radium Therapy," *Am. J. Roentgenology*, 59, 260.

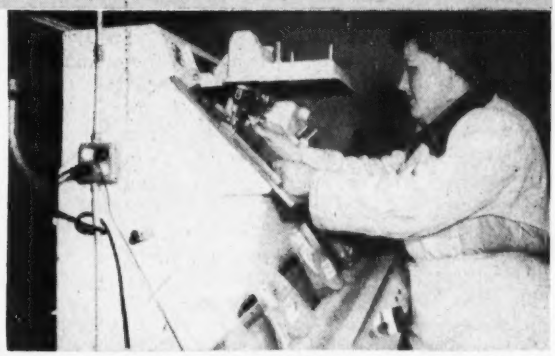
TABLE II—COMPOSITION of Mixed Fission Products Three Months After Removal From Reactor.

Isotope	Percent Contribution[1]	Gamma Energy[1,2]	Gamma Specific Activity (curies/pound)	R_e[3]	α
Cb-95	18	0.758	1800	4.4	70,000
		0.216	1800	1.2	19,000
Zr-95	14	98%, 0.708	1372	4.2	51,000
		2%, 0.216	28	1.2	300
Sr-89	13	none	....	....	.....
Y-91	11	none	....	....	.....
Ce-141	8.6	0.14	860	0.75	5,700
Ru-103	7	0.3, 0.5	700	2.3	14,000
Rh-103	7	none	....	....	.....
Ce-144	6	none	....	....	.....
Pr-144	6	0.7	600	4	21,000
		10%, 1.6	20	8	1,400
La-140	2	20%, 0.5, 0.1, 1.6	40	11.5	4,000
		70%, 0.8, 0.1, 1.6	140	15.5	19,000
Ba-140	2	40%, 0.3, 0.2	80	3	2,100
Pr-143	2	0.7	200	4	7,000
		Total	7640		214,500

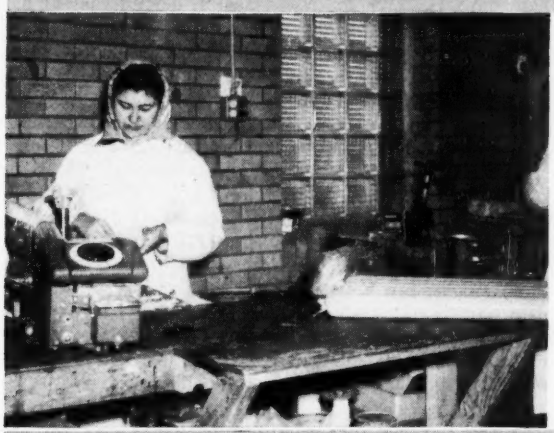
TABLE III—COMPOSITION of Mixed Fission Products Two Years After Removal From Reactor.

Isotope	Percent Contribution[1]	Gamma Energy[1,2]	Gamma Specific Activity (curies/pound)	R_e[3]	α
Ce-144	30	none	....	....	.....
Pr-144	30	0.7	3000	4	105,000
Pm-147	14	none	....	....	.....
Sr-90	5.2	none	....	....	.....
Y-90	5.2	none	....	....	.....
Cs-137	4	none	....	....	.....
Ba-137	4	0.7	400	4	14,000
Ru-106	3.5	none	....	....	.....
Rh-106	3.5	0.5, 0.7	60	3.5	1,850
		Total	3460		120,850

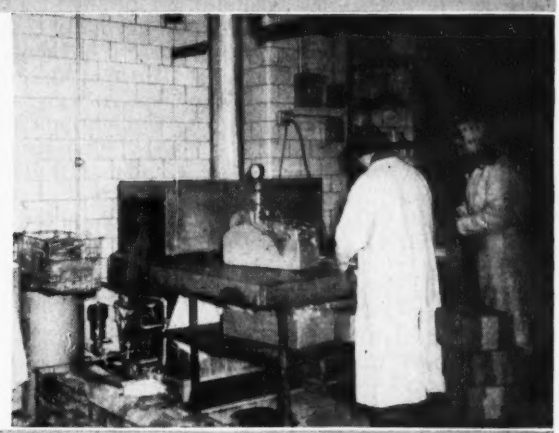
Prepackages by Three Different Methods



1 ON FLEX-VAC LINE, pouch-packed sliced meats are vacuumized and sealed. Left photo: Meats are machine-sliced and stacked by two units, and then packed into pouches. Right photo: Pouches are vacuum-sealed.



2 ON STRETCH-WRAP LINE, chunks of liver sausage are vacuum-packed in tensilized Pliofilm.



3 ON CRY-O-VAC LINE, bulk- and ring-type items are vacuum-packed. Bags are hot-water-shrunk.

Unit-Task Improvements Clinch Profitable Processing Gains

Small packer minimizes down-time, maintenance, product and package losses by astute sharpening of forming, cooking, cooling, and packaging operations

JOHN V. ZIEMBA
Associate Editor, "Food Engineering"

With so little fanfare that few people outside the state knew it, Wisconsin Meat Products Co., Milwaukee, has quietly gone ahead and racked up a 70,000-lb. weekly business of prepackaging sausage-meat products.

Behind this achievement is an outstanding story of advanced unit-process innovations, engineered to cut operating costs and insure non-varying production of A-1 quality items.

Attention-arresting have been the top-important roles taken by this progressive packer in the continued improvement of forming, cooking, cooling, and packaging operations. Furthermore, the doubling up of equipment has, says Vice-President Arnold Bruesewitz, been something to really fall back on during times of machine break-downs, as well as an aid in filling periodic demands for higher daily production.

This doubling-up took place as the company rapidly expanded. It retained its original pieces of equipment as stand-bys, while replacing them with newer units having larger capacities.

Substituted, for example, were: A combination oil- or gas-fired, 85-hp. steam boiler for a coal-fired, 25-hp. unit; a 25-hp. air compressor for a 10-hp. one; and a 40-ton ammonia compressor for a 15-tonner. To augment the packaging line, additional, more advanced, higher speed packaging machines (Cry-O-Vac and Flex-Vac) were purchased.

For a glimpse of what's going on in the latest well-engineered methods at this plant, let's look into some of the key unit operations:

Noteworthy progress has been made with a company-designed system for drawing a vacuum at the stuffers prior to stuffing meats into casings. Involved is a counterweighted metal dome that is lowered over each stuffer, with hook-up to a pump that pulls 29 in. of vacuum.

By evacuating air from the meat, this enterprising firm has chalked up these significant benefits:

- **Air bubble-free products.**
- **More sausage in same size casings—6½ lb. instead of former 5½, for example, for hanging-type sausage products. This, too, amounts to notable savings in casings.**
- **60% reduction in slicing waste.**
- **Increase in product shelf-life.**
- **Improved appearance of certain products. In case of macaroni loaf, for example, meat is pulled in to fill macaroni holes.**

Reason meats were vacuumized at the stuffer, rather than at the mixer, was that the product thus does not become rubbery.

Significant in another forming operation is a quick, labor-saving method of removing jellied loaf products from 4x4x27-in. metal molds. Task of forcing 2,000 lb. of product out of molds took several hours. Now it is done within 10 min.

Loaf removal has been facilitated by this simple newly devised technique:

Bored into the center of the bottom metal plate of each mold is a ⅛-in. hole that is Scotch-tape-sealed prior to each filling operation. Empty molds then are set upright in portable meat trucks, with supporting wires to keep them from toppling over.

Immediately after filling hot jellied product into these molds, trucks are rolled into the cooler for overnight chilling and setting of product. Next morning, truckloads of jellied product are removed from cooler and molds are arranged in a row on a stuffing table.

Speedy removal of jellied loaves from from molds is achieved with the aid of a tapered nozzle that is hooked up to a compressed air line. Nozzle punctures the Scotch tape and compressed air (a pressure less than 40 psi.) surges through the ⅛-in. bored opening at the bottom of the mold to free the loaf.

Another "Unloafer"

Designed by Arnold Bruesewitz was still another technique for rapidly sliding meat loaves other than jellied product out of metal molds.

Involved is a company-built loaf remover that comprises a ¾x8x36-in. plywood board. Screwed into this board to firmly secure each 27-in. long meat-containing mold are a ¼x1x3-in. metal strip near one end of the board and a two-piece plywood block (1¼x 6x6-in.) at the other end. Block is screwed perpendicular to the plywood board, and the inside end of the block is cut out to fit the 4x4x27-in. mold. Inside this ⅝x4x4-in. cut-out are a ¼-in. sponge rubber cushion and a 2-in. square metal baffle plate.

A needle-type nozzle, hooked up to an air line, is inserted into a small hole in the center of the upright plywood block. By operating a finger-tip valve, air (pressure of 40 psi.) is forced through the hole, and the metal baffle plate diffuses the air so that it passes between the mold and surface of the loaf, thus forcing out the loaf.

Also impressive is a new, but simple, method of preventing scum and grease from accumulating on metal molds while vat-boiling meat loaves. Scum-free molds mean easier handling and simpler subsequent cleaning of the molds.

Trick lies in sending cooling water into the 2x4x6-ft. vats at the end of the cook. It is directed to the end of the vat that is opposite to a built-in, 1½x4-ft. overflow pan. Cold water raises the water level in the tank, and the rising scum and grease are trapped in the overflow pan.

Marked improvement in meat loaf uniformity and quality is obtained by inserting a long waterproof probe-and dial type thermometer into the center of one loaf mold that is placed in the middle of a cooking vat. Thermometer determines heat penetration in the meat during cooking—and cooling.

Speedier cooling and setting of meat loaves, as well as a reduction in handling, are being achieved by simple vat-cold-water cooling of loaf molds to a 100-deg.-F. internal temperature. Removed from molds, loaves then are loaded on fresh parchment paper-lined racks for a 4-hr. room-temperature cooling. Racks go into a 34-deg.-F. cooler for final chilling and drying to ready them for slicing.

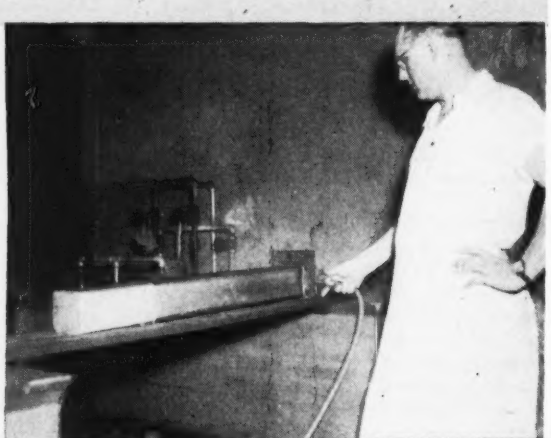
Much time and handling were involved in the former heat-drying (ranging ½-¾ hr.) of the loaves in smokehouses, which are now free for boosting the output of smoked products. A longer chilling of loaves was then required in the coolers.

Centralized Pre-Packaging

Installation of well-integrated packaging lines has enabled this packer to stay on top of the fast-growing field of pre-packaging sausage and smoked meats. Pace-setting are the three lines incorporating the latest units (Flex-Vac, Cry-O-Vac, and Stretchwrap) for

Two Significant Operations That Save Labor

OVERFLOW PAN on boiling vat traps rising scum and grease at end of cook, cuts mold cleaning time.



SPECIALLY DESIGNED meat-loaf remover pneumatically slides loaves out of molds in a jiffy.

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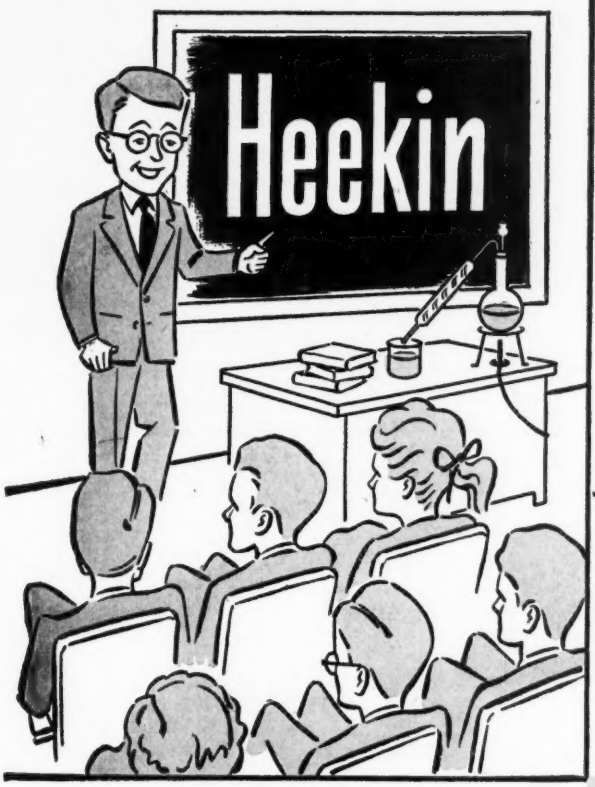

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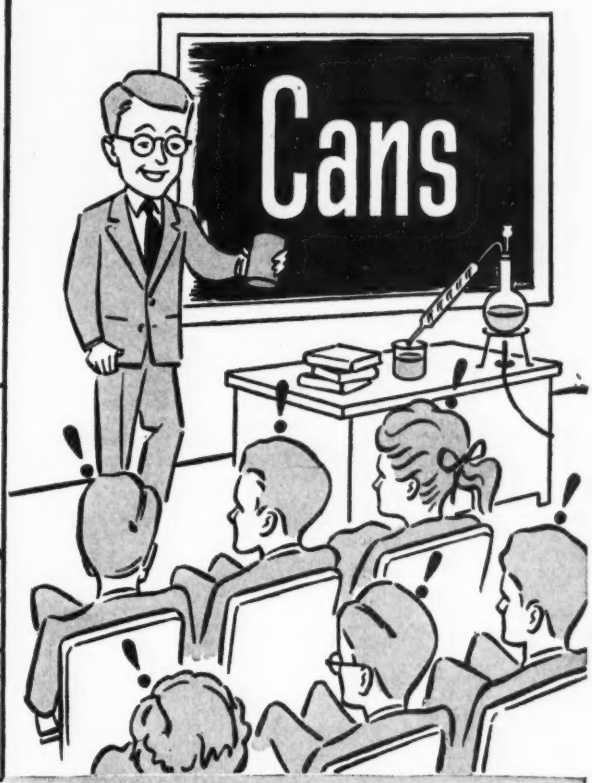

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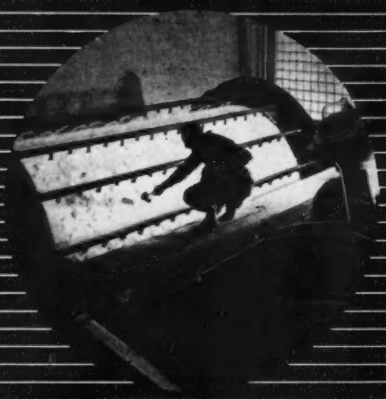

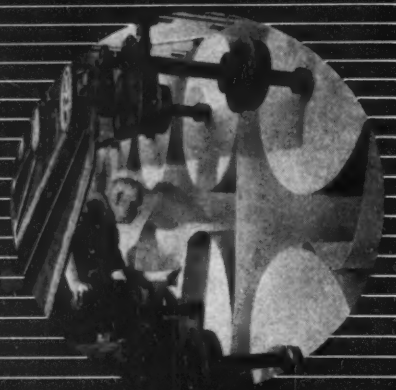

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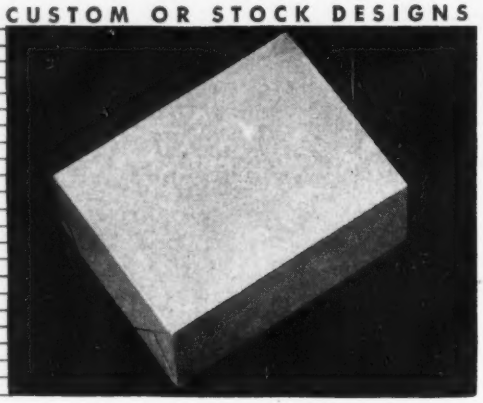

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pre-packaging a diverse array of products. Each unit was selected to package specific type products.

For example: the company handles, on its Flex-Vac line, sliced meats—luncheon meats (seven 1-oz. slices), ham and Canadian bacon (catch weights), and molded chip beef (4 oz).

Sliced luncheon meats, for instance, are sliced and packaged in this manner: Two U. S. Slicing machines cut 200 slices—and stack two groups of 7 slices at a time—per min. Each machine takes two 27-in. loaves at a time. Stacks are spot-check-weighed and hand-inserted, with aid of a bottom-corrugated plastic scoop, into polyethylene-cellophane pouches. Corrugations in scoop facilitate sliding of the slices into pouches.

An 8 in.x20-ft. canvas belt carries pouches from the two packing stations onto a right-angle transfer belt (6in.x 8 ft.) going to a two-head Flex-Vac vacuumizing-sealing machine. Dragging of meat-filled pouches, moving along the latter belt and a 4-in.-high stainless steel side plate, is minimized by a ¼-in. endless leather belt.

To avoid accumulation of meat-filled pouches at the transfer point, speed of the second conveyor is about 8 ft.-per-min. faster than the first. Respective per-min. speeds of these belts are 20 and 28.

Fast output—about 2,100 pouches hourly—was engineered into the new model Flex-Vac machine by: (1) Shortening the vacuumizing-sealing time, and (2) designing alternately operating vacuumizing-sealing heads that enable the operator to load one while the other is vacuum-sealing.

A 29-in. vacuum is drawn into the pouches, and they are sealed at about 310 deg. F. Pouches then drop onto a third belt (6x30 in.). At the end of this short conveyor they fall about 1 ft., to be cushioned by a 1-in. sponge rubber pad on a combination inspecting-packing table.

Pouches are inspected for wrinkled seals—a potential source of leakage—as they are stacked for packing into shipping cases. Inspection is facilitated with the aid of a 100w. light bulb recessed in the packing table.

Gum paper-taping of the cartons is simplified, too. It's done with the aid of an electrically operated Marsh Dial Taper. Dial is finger-operated to cut off the desired length of tape. Dial is set for 3-in. lengths, up to a maximum of 39 in.

Employed to code expiration-date along one of the side seals of these pouches is a Pitney-Bowes machine. Coding of 400 pouches takes but 30 sec. The expiration date set for vac-packed sliced meats is 4 weeks, although they keep much longer when distributed and handled under proper refrigeration.

Another Line in Action

Ring and bulk-type items are packaged on the Cry-O-Vac line. These include such products as ring bologna and ring blood, fresh country-style pork and Italian sausage, Polish and smoked pork sausage, boiled ham, meat loaves, and smoked butts.

These products are hand-fed into Cry-O-Rap bags that are fed to a girl operating the latest semi-automatic Cry-O-Vac horizontal vac-sealing machine with two motors operating simultaneously—a ¼-hp. vacuum-pump motor and a ⅛-hp. drive motor.

Slipping the open end of the bag around a nozzle, the operator applies light pressure on a foot pedal to pull a vacuum into the bag. Full pressure on the foot pedal then spins the nozzle to twist the end of the bag. Removing the bag from the nozzle, the operator then transfers the twist part of the vacuumized bag to the jaws of the crimper, which seals the bag with roll-fed aluminum clips.

Operating 20 times per min., a 2x2¼-in. air cylinder powers the clip-closing mechanism. Air cylinder requires about 0.07 cu. ft. of air per min. at a pressure of 50 psi. Operator then pulls bag up to a cut-off knife that snips off excess twisted-end from the bag.

Bag-sealed products then are carried through a shrink tunnel by a 5-ft. stainless-steel slat-type conveyor. Bags are hot-water-shrunk to make them fit the product snugly. In its 2 to 3-sec. travel through this tunnel, the bags are sprayed with hot water (about 200 deg. F.), which is fed from a 3¼-in. overhead pipe. Slits (about 4-in. long) in the pipe play a narrow stream of hot water on the traveling packaged products. An 8-in. vent carries off excess moisture vapor to prevent fogging of the room.

Bagged meats emerge from the shrink-tunnel and go onto a 2-ft. wire-mesh draining-drying conveyor designed to eliminate hand-wiping of packages prior to packing them into shipping cases. Drying is achieved by ½-in. pipes (one below and the other above the belt), with 3/32 in. perforations to emit forced air onto the bags.

Pressure-sensitive labels are coded with expiration date by an electrically operated company-made unit. From a roll, scored labels pass a spring-actuated coder that meets each label on its downward stroke. After inking the date on each label, the coder springs up to receive fresh ink from a cam-operated inking pad. Labels then are hand-applied to bagged products.

Expiration date set on items packaged in Cry-O-Rap bags is 14 days.

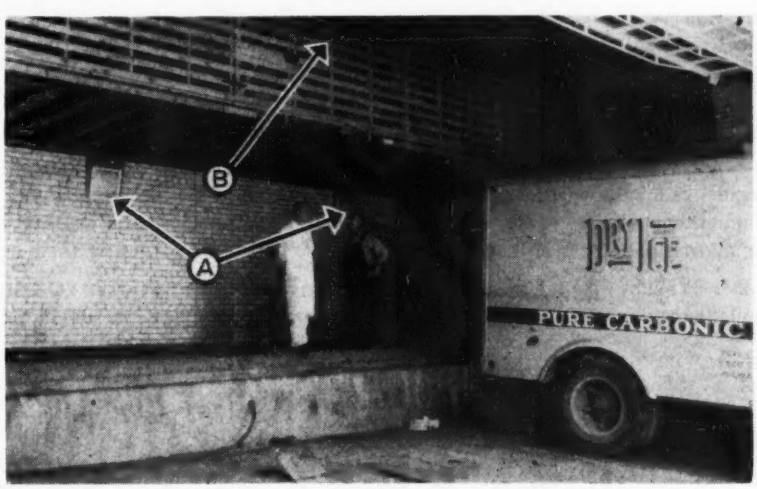
Stretch-Wrapping Products

Packaged on the third line is another group of products that include 6 to 8-oz. chunks of fresh and smoked liver sausage and collar-packed wieners (1 lb.). Preceding this Stretch-Wrap line, in the case of wiener-packaging, is the latest Linker machine peeler that automatically strips cellulose casing from about 200 frankfurters per min.

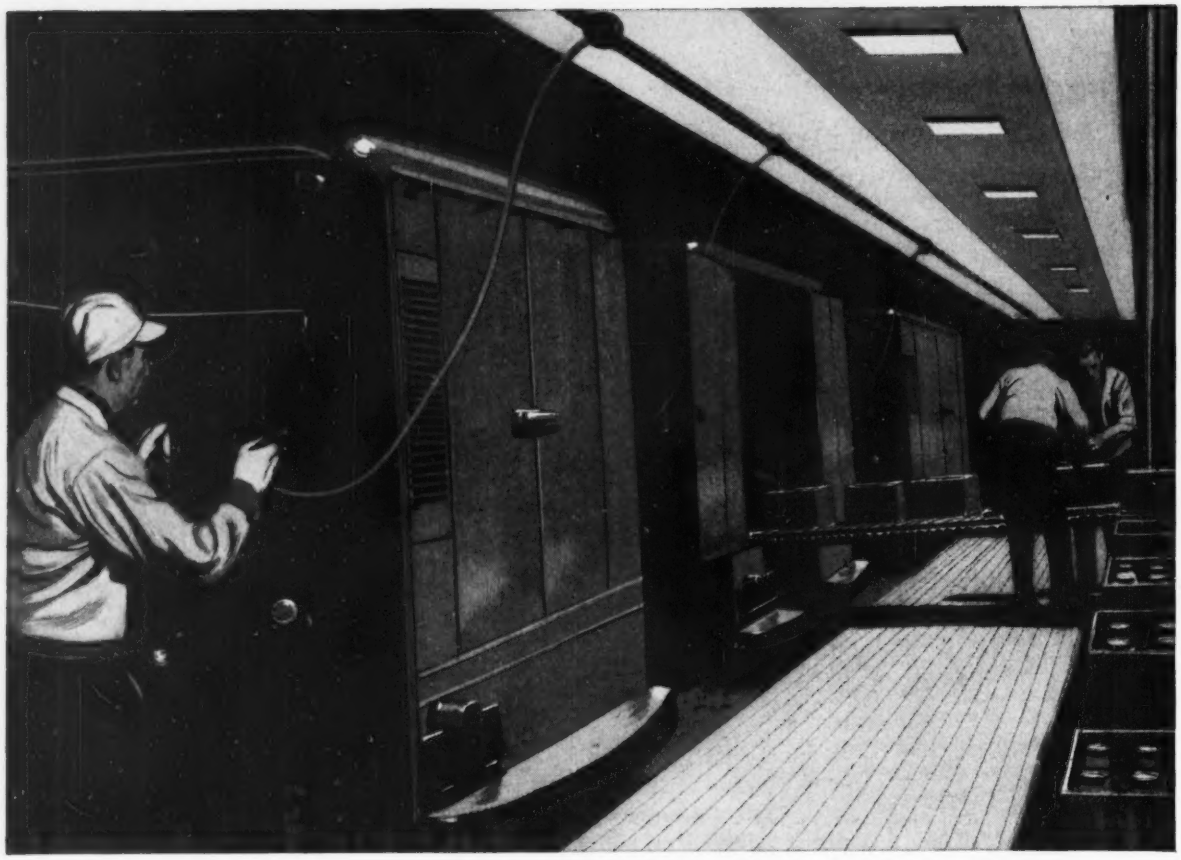
Stretch-Wrap packaging is carried out in this manner: Pliofilm is fed from a roll onto a 9-in.-dia. sponge rubber heating pad, where it is heated to 217 deg. F. prior to stretching. Film continues to the stretching unit. Thereafter, product is hand-fed into the center of the film.

Film and product are pulled down into a cylinder by vacuum. A series

(Turn to page 160)



RECESSED LIGHTS (A) in loading dock facilitate truck loading and unloading operations. Overhead storage area (B) makes most of formerly unused ceiling space.



General Electric announces an electrical system for 24-hour truck refrigeration

Now you can equip your local-delivery milk and food trucks with dependable, economical 'round-the-clock refrigeration equipment. It's possible because General Electric has developed a compact new electrical system especially for operation as a truck-refrigeration compressor drive.

RELIABLE 24-HOUR SERVICE is provided because this G-E electrical system operates equally well off the engine crankshaft—delivering 100% capacity even when the engine is idling—and off 115-volt plug-in, for night-time storage.

G.E.'s SYSTEM PAYS FOR ITSELF, too. It's more convenient than ice refrigeration, won't cause truck-body rust. Small and compact, it makes possible an increase in pay load. By maintaining constant low temperatures, the G-E system reduces the waste of enroute spoilage, pleases customers by delivering your products cool and fresh.

BEFORE YOU ORDER new local-delivery milk and food trucks, be sure to discuss this versatile new G-E electrical system with your truck-body builder or truck refrigeration equipment supplier. These concerns are invited to obtain full information by contacting their nearest G-E Apparatus Sales Office.

WRITE FOR DESCRIPTIVE BULLETIN GEA-6084 to Sect. 704-39, General Electric Co., Schenectady 5, N.Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

TASTY Polish sausages, hanging on monorail-conveyed cages, get their final inspection by President Joseph Slotkowski. Sausages are chilled in tile-wall coolers with overhead ultra-violet germicidal lamps.

Their *New-Style* Processing Improves *Old-Style* Quality

Traditional products now consistently uniform as modern techniques go in all along line . . . Mashing of meats and ingredients averted, and goods pack tighter . . . Efficiency teamed with sanitation saves many man-hours

JOHN V. ZIEMBA
Associate Editor, "Food Engineering"

There's mighty substantial business in supplying the ever-continuing demands for the historically popular foods—not only those developed in our own land but also those brought from the old world and now flourishing here anew.

Thus, Polish-style sausages (particularly *Kielbasa*) and wieners are leading items in the Chicago area. Featuring high spicing and coarse grinds, they constitute about one-third of the output of Slotkowski Sausage Co., a forefront packer in the field producing 750,000 lb. weekly. Other goods include further sausage items, hams, meat loaves, jellied meats, and smoked products.

This firm has been preparing Polish sausages according to formulas followed by the old Poles themselves.

► **But there is a big difference. Today they are produced with the new care, uniformity, and quality made possible by modern processing techniques employing advanced equipment and facilities.**

Also notable is this company's skill in blending its own spice mixes for use in the taste-tempting, old country-style sausages.

Modern Facilities

Plant design reflects top notch sanitation and efficiency. It includes stainless steel equipment, stainless cooler doors, and stainless-clad supporting columns.

Throughout the plant, walls are of tile, and all coolers are equipped with ultra-violet germicidal-ray lamps.

We shall point out specific examples of improved processes engineered in the sausage-making operations.

Raw Materials Handling

There is straight-through, unimpeded handling of barreled meats coming in for use in sausage or smoked meat products. The barrels are rolled off trucks and onto a retractable unloading dock (3x3x5 ft.). When dock is retracted, it rests on a short angle-iron support, which is bolted to the receiving-area wall.

From this home-made unloading dock, the barrels slide down a 2x15-ft. chute to a floor-level scale. This barrel-sliding is facilitated by setting the chute on an approximate 25-deg. angle and by bolting onto its surface two

greased metal strips (¼ in. x 2 in. x 15 ft.), spaced 8 in. apart.

After scaling, barrels are dated for rotation purposes (first-in, first out) and then similarly chuted to the cellar for holding in one of three fin-coil-refrigerated (36 deg. F.) coolers.

To Grinding Room

From cooler, meats go either to the nearby curing cellar or they are elevated by a two-barrel-capacity electrically operated lift to the sausage-grinding room. Washed empties then continue out of an adjacent side door for truck removal.

Frozen pork cuts—boneless loins, blades, butts, etc.—go to a −15 deg. F. basement frozen storage room (20 x 25 ft.).

Barreled natural casings are handled in a like manner. From the scales, barrels are rolled to a floor-level metal-plate door adjacent to the unloading dock. From here, they slide into cellar coolers over a double-rail chute.

Preparing Sausage Meats

Meat-grinding is carried out two ways. Meat to be prepared into the coarser ground products, like Polish sausage or wieners, is charged into a grinder with an automatic built-in feed hopper. Unit consists of oppositely rotating 2-in-1 worm screws. Outer worm screw feeds meat from hopper, through a slot, and into the inner worm screw, which carries it in reverse direction through a triple plate-and-knife arrangement for coarse and fine grinding—and in one operation. Grinding in this unit eliminates mashing and heating of the meats.

In the second method—preparing the finer ground products like bolognas and meat loaves—meats are put through a conventional-type grinder. Then, in a 700-lb.-capacity silent cutter, the ground meats are finely chopped and blended with spices, snow ice, and other ingredients.

To avoid mashing of pickles, pimentoes, macaroni, cheese chunks, or similar materials to be incorporated into various meat loaves, the batch then is transferred from silent cutter into a ribbon-type horizontal mixer. Here, a 20-in. vacuum pulls air out of the product, thus producing tighter packing meats.

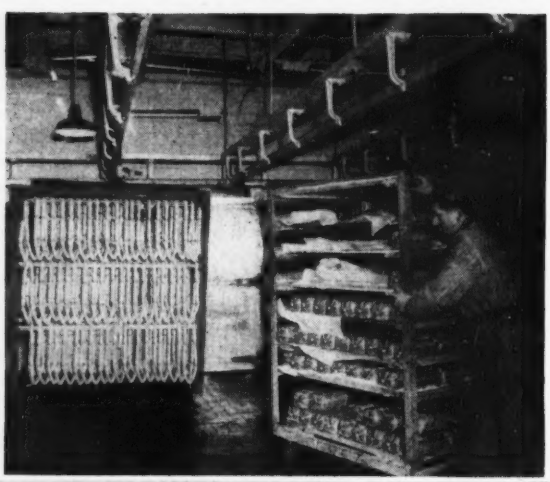
Batches of the ground, prepared meats then go to the nearby stuffing room, where there are three units of 500-lb. capacity. One stuffing table is equipped with two linking-tying machines for preparing the skinless wieners.

On a second table, certain other sausage products are hand-linked and string-tied, while the third is for stuff

PRESSURE-PACKER assures production of firm, uniformly stuffed, eye-appealing smoked boneless meats.

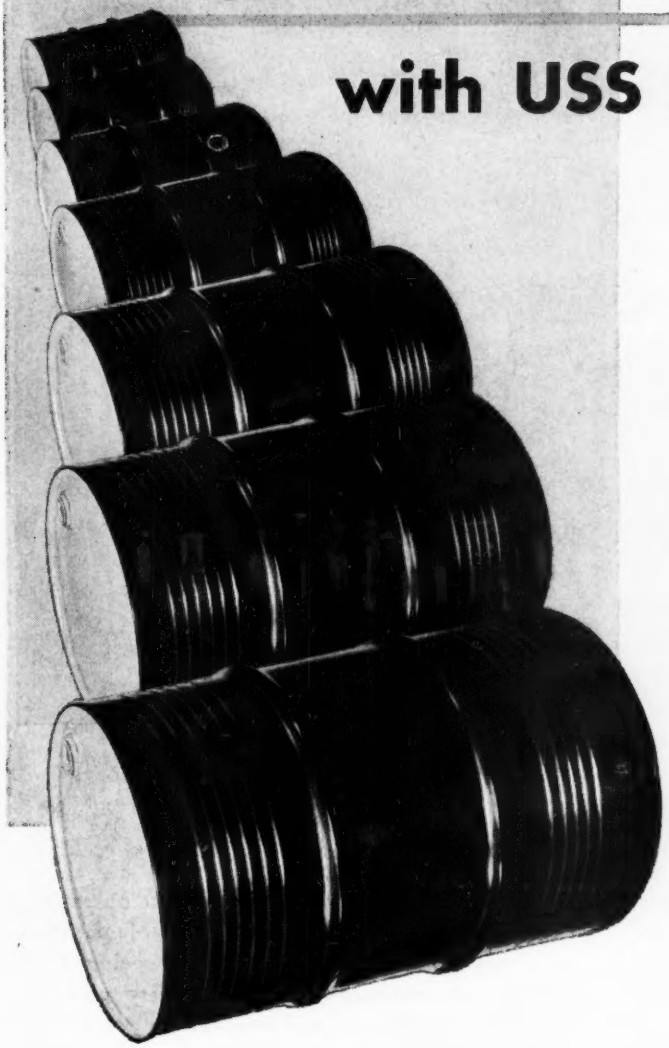
LOW-COST quick-curing unit handles about 300 pork bellies hourly. It's used, too, for curing other items.

PACKAGING of link sausages is speedy and easier, for they're now pre-firmed in freezing tunnel.



COOLERS have sanitary tile walls, stainless-clad columns, fin-coil refrigerating units, u-v lamps.

You get "built-in" quality control with USS Steel Drums



EFFECTIVE quality control *can* be extended beyond your own manufacturing operations. It can go right along with your product after it leaves your plant . . . when you use USS Steel Drums. This means the end of costly customer claims that result from scale, dirt, grease and rust contamination. For now, with scale-free, rust-inhibited USS Steel Drums, you can guard the quality of your product between the time you ship it and the time the customer actually uses it.

These sturdy steel containers are made of high grade USS Steel. A truly effective rust-inhibiting coating has been applied to a surface that has been cleaned — physically and chemically — so completely that the protective coating will not flake off or be undermined by rust and corrosion. USS Steel Drums are better for you . . . better for your customers.

• • •

United States Steel Products fabricates stainless, galvanized, tinned, painted and decorated drums and pails. Furnished in a wide range of capacities with a variety of fittings and openings to meet your particular requirements.

WRITE FOR FREE BROCHURE

If you want further information on this quality steel drum, write to us at New York for this full-color brochure, "USS Drums — 100% Scale-free and Rust-inhibited."

"It's Better to Ship in Steel"

UNITED STATES STEEL PRODUCTS
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USS STEEL DRUMS

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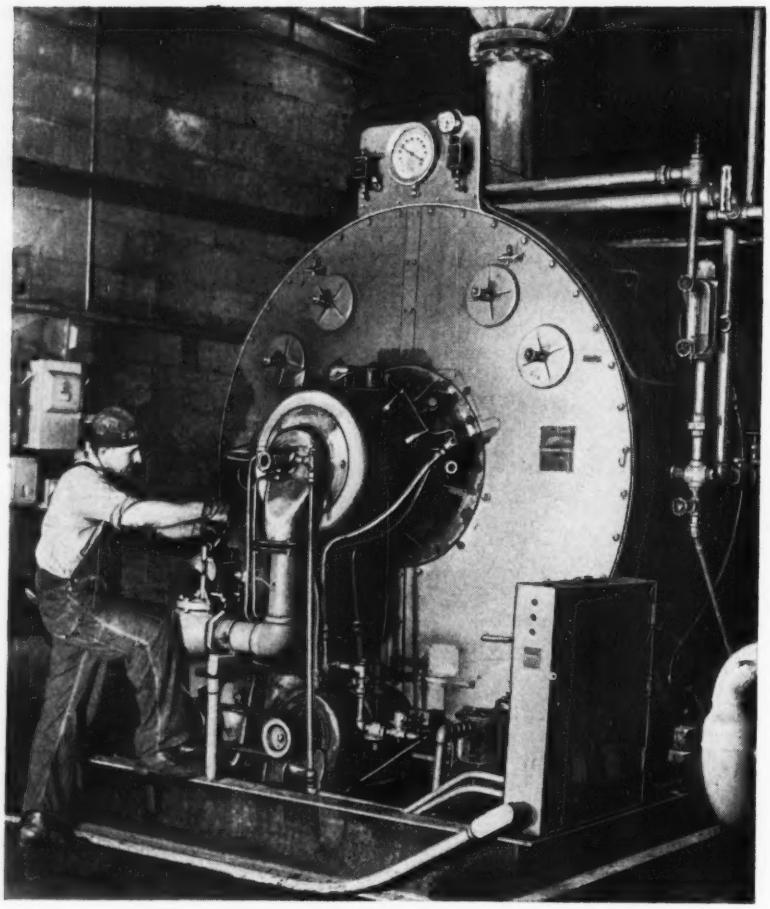
UNITED STATES STEEL

Use coupon on page 227.

IN MEAT PACKING PLANTS...



Powermaster® Performance Pays Off

FOR EXAMPLE: Continuous satisfaction with the performance of a 150 HP *Powermaster* purchased several years previously led to the addition of this 250 HP gas-fired *Powermaster* at a Mid-West meat packing plant.

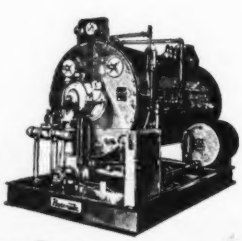
Savings with *Powermaster* Packaged Automatic Boilers start with their compact, simplified installation. No special foundation or costly stack is needed. As delivered, *Powermasters* are completely factory assembled and factory fire-tested, fully equipped and wired ready for operation as soon as fuel, electric and flue gas connections are made.

Once installed, *Powermasters* keep right on saving. High fuel economy at all loads, dependable performance, time-saving attention, maintenance-saving accessibility, automatic operating and safety controls, smokeless combustion, and hospital-clean operation ... these are reasons steam costs go down where *Powermasters* go in.

To keep your steam costs in line... compare *Powermaster*, and you'll see why it is so widely used in all kinds of food processing plants. Send NOW for new bulletins on *Powermaster's* cost-saving advantages.

O-S *Powermaster*® **PACKAGED AUTOMATIC BOILERS**

In sizes to 500 HP; pressures to 250 psi.



ORR & SEMBOWER, INC.

Morgantown Road, Reading, Penna.

ing bulk products like meat loaves and hanging-type items.

From linking and tying tables, cageloads of product are monorailed through a company-built shower. Unit consists of three 1½-in. pipes, formed into an H-shape and having eight spray nozzles spaced along them. Beside the pipes parallel to the monorail are 20-in. wide galvanized metal sheets that confine the showering water so that it sprays over the products.

Uniform Smoking

No longer do smoking problems cause management heads to throb, since installation of three bank-to-bank, single-story, stainless-steel smoke-houses, with a fully automatic system of abolishing cold spots.

"Doctor" that has eliminated need for aspirin is the system of automatically-operated dampers that alternately vary circulation of smoke and heated air from two rows of ceiling-high inlet ducts on either side and running along the entire length of each 6-cage house.

By thus automatically eliminating cold pockets, more uniform products now are being turned out—and within a much shorter time. Too, product shrinkage has been reduced, and so have operating and maintenance costs.

Immediately after loading a smokehouse, a 3-hp. blower circulates fresh air through the house to dry products and remove excess moisture. Then warm air from a fin-coil heater is duct-fed into the house and circulated through it. Smoke, fed from a floor-level duct, is circulated through the house and then exhausted, along with hot air, through a ceiling-high center duct. Both smoke and hot air pass through the heater and back into the house through either one of the two wall-side, ceiling-high inlet ducts.

Controlled Temperature

At this stage, flow of incoming smoke and hot air is alternately reversed by the motor-driven dampers. Flow is downward along the wall of one side of the house, across the floor, upward through the products, and out the center exhaust duct. Dampers then reverse the flow of incoming smoke and hot air through the opposite inlet duct and downward along the other side of the house. Smoke continues upward through products, and after it is exhausted the cycle is repeated.

Temperature of each house is automatically controlled and recorded. Smoke density is damper-regulated. Steam is piped to the heater atop each house, and condensate is returned to the boiler.

Adjacent to the smokehouses are two Jordan cookers, which are used for coloring certain sausage items. Coloring solution, at 170 deg. F., is pump-circulated from a 10-in.-deep bottom trough, through overhead sprays, and over a cage-load of sausage products. Showering wieners with hot coloring solution, for example, takes 12-15 min. Color-tinted products are then rinsed in a 4-cage shower.

About Other Products

Meat loaves are either baked or boiled. Baking is carried out in a traveling tray-type oven, which is equipped with timer and temperature indicator-controller.

Boiling of meat loaves and certain natural casing-stuffed items takes place in six, side-by-side, stainless steel vats. Floor in this area is pitched to drain water from vats and into sewer.

Jellied products like souse are filled into 10-lb. capacity metal molds or 6-lb. non-returnable tins, both with a ¼x4x10-in. wooden board on top to serve as a cutting board in retail stores. Tests are now underway to substitute waxed or laminated paperboard for the wood.

Showered sausage products from smokehouses are railed to a 30x30-ft. room for holding period of about 2 hr. prior to moving them into 45-deg.-F. coolers. Room-temperature holding prevents subsequent sweating and possible spoilage of sausage meats in coolers.

Cellulose casings are stripped off skinless franks by two Linker peelers, each handling 200 wieners per minute. They are machine-banded into a row of a dozen, and then carton-packed. Natural-casing wieners of the Polish style are directly carton-packed or put up in 10-lb. polyethylene or stockinette bags.

Special Sausage Packing

Speedier handling and packaging of link sausages have been achieved by using a special tray-type rack for rolling them into a −20 deg. F. blast freezer (two-rack capacity) and a specially designed packing scoop. Holding sausages for ½-hr. in the freezer makes them firm, dry, and easier to handle during packing. Otherwise, they are moist, limp, and more difficult to package.

Racks hold 15 stainless steel trays, and ½-in. high stainless strips divide each tray into six sections. Each section contains 50 link sausages, or a total of 300 per tray.

Racks are removed from freezer into a 12-rack capacity, 30-deg.-F., horseshoe-shaped cooler, ready for packaging.

Packaging is further simplified by cutting string between linked sausages nesting between either side of the second and fourth dividing-metal strip. Sausages are now linked to each other in three double rows, for easy scoop-packing of a dozen sausages (a double row, six sausages to a row) at a time into cartons. Packed into each carton are three layers of sausages, with a dozen sausages to a layer.

Packing scoop is of stainless steel. It is 6x10 in., with a slot in the center to fit through the metal-dividing strip while scooping sausages from trays. A ½-in. vertical metal strip on the end of the scoop serves as a holding handle for the packer.

Through installation of a simple, manually operated quick-curing unit—for bellies, tongues, butts, and boneless loins—more uniform quality products are now being turned out in less time and within a smaller space.

Employed is a low-cost Hydrojet unit (Presco Products, Flemington, N. J.) that handles about 300 pork bellies an hour. Product is loaded onto unit, and a hinged-type plastic lid is pressed down and over the meat. Pressure of the lid over the meat forces curing brine through 66 stainless steel needles and into the meat for uniform diffusion of cure.

New Pressure-Packing

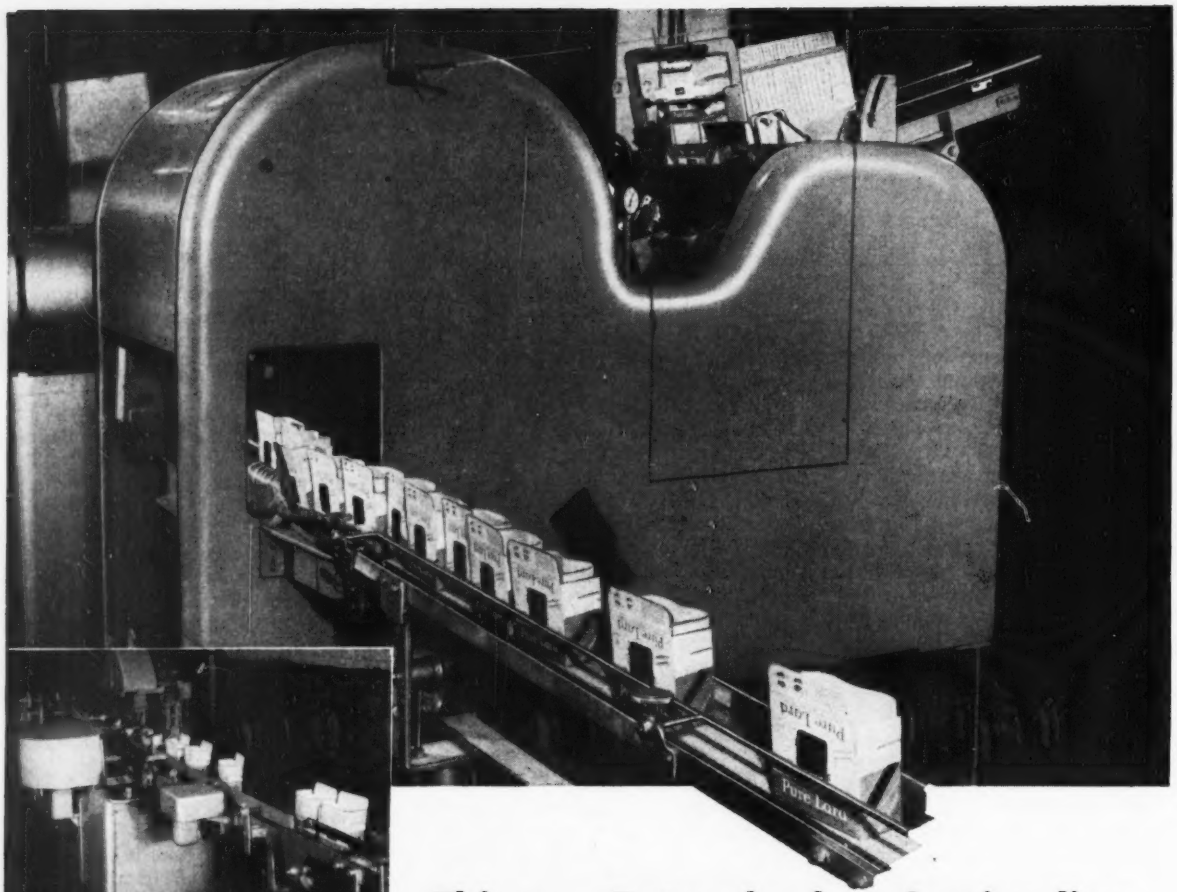
Another work-saving aid is the new semi-automatic method of pressure-packing boneless cured-smoked meats in fibrous casings. Employed is a Soli-Tie unit (Vac-Tie Fasteners, Inc., Elizabeth, N. J.) that mechanically compresses meats in casing to provide them with a firm, uniformly-stuffed, eye-appealing appearance. Moreover, the new unit paces a pneumatically operated stuffer, and it has about halved former hand pressure-packing costs.

Pressure-packer works in this manner;

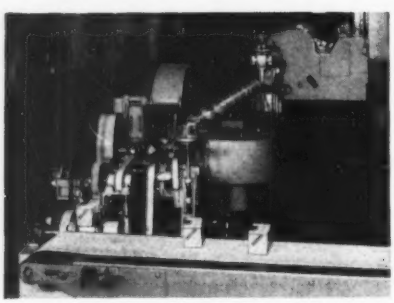
Operator slips loose end of stuffed meat into semi-circular collar-pressure plate and twists product as he places it on unit's holding plate. Loose end of casing is then secured by a pneumatically operated jaw-type gripper.

Operator presses a foot pedal and a clamping-die piston then moves downward to loosely position a lipped aluminum fastener about the loose end of the casing—and nearest the product. Another foot-operated pedal activates the gripper piston to draw product against the pressure plate, while the operator continues to turn the product, pricking moisture pockets to complete the pressure pack.

A hand-operated lever actuates the clamping piston to completely seal the metal fastener. Excess casing is then cut off.



Photos show installation of Peters lard packaging equipment. Top photo shows new Model SE Carton Forming & Lining Machine. Above photo shows new Model CCY-L Carton Folding & Closing Machine.



This view shows complete lard packaging line, combining compactness, terrific efficiency and exceptional dollar-saving performance.

This new Peters lard packaging line DOES THE WORK OF 16 MACHINES!

It's fantastic but true!

This hard-to-believe lard packaging performance originates with a new Peters Model SE Carton Forming & Lining Machine at the set-up end. Closing and folding is done by a Peters Model CCY-L Closer.

The fantastic record becomes believable when you examine these facts:

A. The Peters SE-CCY-L line operates at 120 or more cartons per minute ... *twice the speed* of previous equipment. Thus *two machines do the work of four.*

B. The Peters SE-CCY-L line handles *all* carton sizes — with quick, on-the-job adjustments. Thus when you package two carton sizes, at double speeds, the new line does the work of *eight* non-adjustable machines. When you package *four* sizes, the new line *does the work of 16 machines!*

Lard packaging costs are slashed to fractions . . . just what's needed to make lard a better-paying product.

Savings are so tremendous you gain no matter what speeds you run . . . no matter how many carton sizes you produce.

Don't wait. Order now for early delivery.

Your Peters engineer will gladly help you determine your specific requirements. Write, wire or call . . . . .

Peters MACHINERY COMPANY

4708 Ravenswood Avenue
Chicago 40, Illinois

ONE GLANCE at this big U. S. chart—graphically dotted with colored key-point pins, route lines, and pertinent schedule data—gives the whole picture of Armour's widespread distribution. And thus, striking new delivery flexibility has been engineered by the company's special distribution team, ably "coached" by H. O. Mathews (center).

Map Technique Quickly Unravels Delivery-System Snags

Research experts pinpoint trouble spots needing adjustment, then come up with procedures that speed operations and cut costs

"OUR TRUCKS REALLY will 'deliver the goods' along most efficient lines possible—if we get a true, overall picture of our distribution system—and then act on it.

"Further, our customers also will enjoy notable benefits from the resulting faster and better service."

This has been the thinking of a team of Armour and Company experts working under the direction of H. O. Mathews, general manager of the firm's transportation and distribution division.

Once these researchers got to studying the situation, it speedily became apparent that growth of markets, mechanical advancements in all forms of road vehicles, and constantly changing highway conditions had wrought decided changes. And this made high maneuverability essential in the handling setup—meaning an accent on flexibility to meet varying needs.

Basic project of the researchers was to analyze distribution within the company's territories. After recording the route and checking the tonnages handled daily by each truck, the location of break-bulk points, and the number of product handlings on each route, all data were brought back to Chicago.

There the information was transcribed on a large map of the sales territory (seen in photo). Different colored pins denoted each daily route, giving in a quick glimpse a better perspective of the handling network than days of report reading.

Further this map was photographed onto slide films to be shown at meetings attended by personnel responsible for streamlining the distribution process.

Studies by the team have, first off, indicated that it is most practical to service the dealers directly from the plant, up to a distance of 100 miles. Within that radius trucks can return to the plant on the same day.

For the longer runs extending over 100 miles, break-bulk operations were found feasible, and the map quickly showed the sites most economical for spotting such points.

One of the early results of the research work was the unusual Chicago South Bend, Ind., break-bulk point operation.* In this setup, two trailers, loaded at Chicago with orders in proper delivery sequence, are hauled over the road in a double-bottom tractor-trailer train to a break-bulk point. There the train is broken up and the trailers are hauled over their local delivery routes by two South Bend tractors.

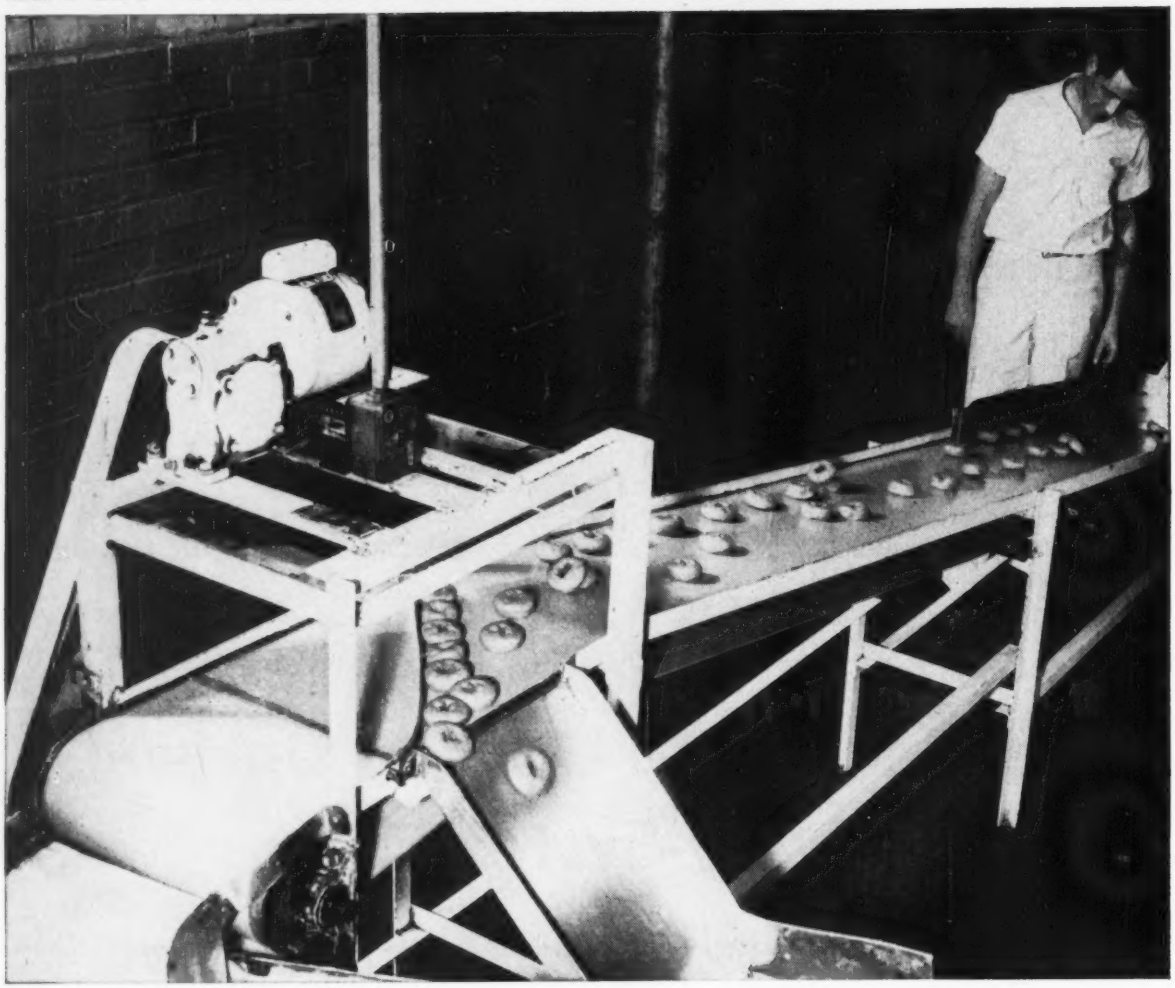
The entire handling procedure has been managed without benefit of a sorting platform. Also, there is no interim transfer of the meat products, which remain under refrigeration.

Another example of the economies achieved through studies of the distribution map is the new routing of

(*Turn to page 151*)

* See "Trailers Double as Route Trucks," FE July, p. 129

B. F. Goodrich announces



Cooking oils can't harm this belt—it's Koroseal

HERE's the new Koroseal belt that's making important savings in bakeries, food processing plants and other places where cooking oils, meats, nuts, greasy pans used to shorten the life of canvas, rubber and plastic-coated belts.

Because it's made of Koroseal flexible material, this new B. F. Goodrich belt is not affected by cooking oils, animal fats, most acids—and stands hard use, rough handling, heat, cold, and just about everything else that ruins most materials. Koroseal resists cracking and peeling, doesn't get soft or sticky. It's nontoxic, too, and has no odor or taste to transfer to foods.

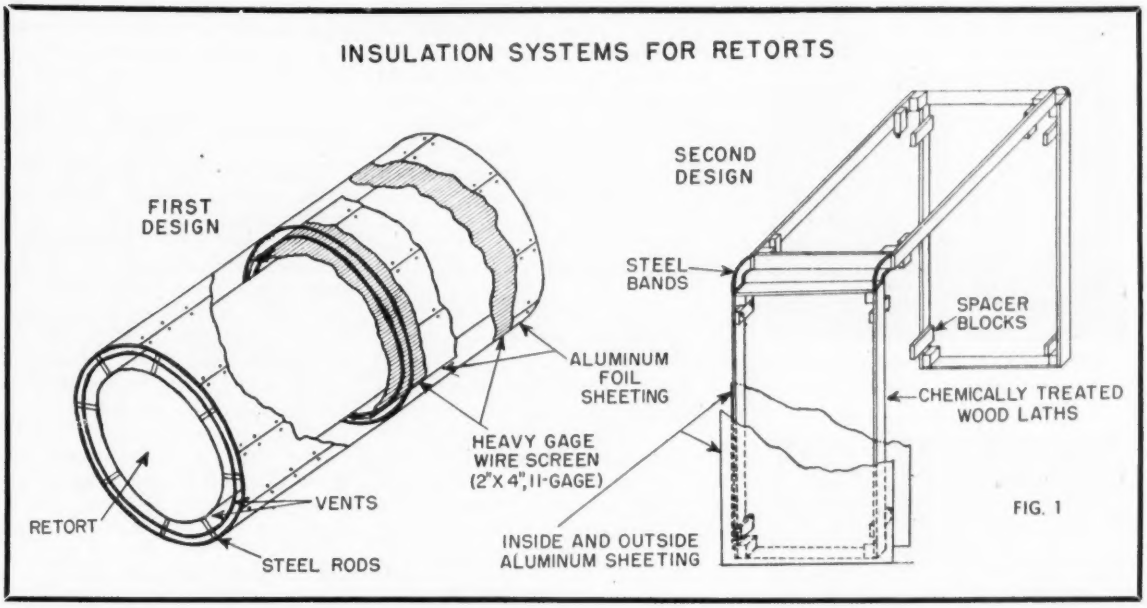
The Koroseal belt has a smooth, polished surface. Food particles can't grind into it. That's what makes the belt so easy to clean. Sticky icings, oily foods, most stains come off with a damp cloth. Or you can use detergents and water as often as you wish. Either way, cleaning time is cut in half. And since Koroseal is completely, permanently waterproof, the belt cover never gets damp or soggy, and so can be used right after washing.

Other new belts, developed by B. F. Goodrich for food handling, include a thin white Koroseal belt for use in cooling tunnels, and two belts, called Highseal and Kleenseal, that are made of new types of rubber compounds. Their "sight-saving" green color reduces glare and eye strain on packaging and inspection lines.

It will pay you to find out more about these work-saving, money-saving improvements in food handling. Have your BFG distributor survey your belting needs and recommend the right B. F. Goodrich belt for your process. If you don't know the distributor nearest you, write us and we'll send his name. *The B. F. Goodrich Company, Dept. M-297, Akron 18, Ohio.*

Koroseal—T. M. Reg. U. S. Pat. Off.

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION



"HOW-TO" DETAILS. Left: On freely accessible retort, aluminum foil can be applied directly to wire backing mounted on unit. Right: On retort of limited accessibility, job is done with pre-fab assembly incorporating wooden frame and flexible steel or aluminum bands.

Saves 50% of Retort Steam

Heat loss reduced by reflective aluminum foil and dead air space. Developed by AMIF to meet food plant conditions. Construction details given

L. J. PIRCON
Chemical Engineer,
American Meat Institute Foundation, Chicago

One of the major undesirable characteristics of retorting, or cooking, of canned meats is the high retort-room temperature resulting from heat losses from retorts and steam lines.

In fact, tests at the American Meat Institute Foundation have demonstrated that as much heat is thrown into a room by an uninsulated retort as is used in retorting. Thus, such a retort is about as effective in "cooking" personnel as in cooking meat.

▶ This launched us upon a series of experiments—with the result that reflective aluminum foil and dead air space were disclosed to be most effective counter measures.

In the heat-loss conditions in question, personnel are not very productive, and since the boiler must make up for the heat losses, this is not a practical or safe method of retorting. *Even a low pressure process, as was involved in our studies, induced outside wall temperatures of 223 F.*

When this problem is approached with scientific inquisitiveness, several factors complicate its solution.

Normally, a thermal energy loss through heat transfer from a piece of equipment can be eliminated by application of standard commercial insulators. However, the physical, economic, and sanitation limitations associated with this process limit the use of such materials in this type of installation.

Required is an insulating material that is not porous or fibrous enough to provide a habitat for insects or rodents. Material and installation cost should be low. It should not induce or facilitate corrosion. Because of limited accessibility to some retort installations, the insulation should be easy to apply. It should withstand simple operational abuse. Last, but not least, it should lend itself to washing or other plant-sanitation practices.

About Heat Transfer

Assuming that these requirements could be fulfilled by some material, then its insulating effectiveness also must be analyzed. Further to be considered is its effect on any possible heat-transfer phenomenon. Since heat transfer occurs in three forms—conduction, convection, and radiation—these should be considered in a general analysis of the problem.

In case of heat transfer from a hot surface to air capable of convection motion, the mechanism of conduction need not be considered, because a negligible amount of heat flows in this manner, except possibly through a very thin layer of air adjacent to the interface. However, even this is normally accounted for in the convection heat-transfer coefficient.

Because the emissivity of the average retort surface is high—even at a retort-surface temperature of 180 F.—as compared with a surrounding temperature of 95 F., the radiation-transfer coefficient is slightly greater than the convective coefficient. Therefore, both radiation transfer and convective transfer should be considered in the insulation design.

Since a plant superintendent of one of the larger packing houses had reported a badly corroded retort due to a surface-applied insulation, it was obvious that a new design would have to avoid such a possibility. In this case, it was believed that the insulation became separated from the metal surface due to the repeated heating and cooling of the retort, and that steam con-

top surface. This had the appearance of a U-shaped aluminum flat-surfaced saddle. The bottom aluminum surface was separated from the hot retort wall by spacers attached to the frames.

Wooden laths, wire, pressed fiberboard, and cellular glass were considered for frame-building materials. Finally, chemically treated wooden plaster laths were judged most suitable. Function of the chemical is to prevent wood decay caused by continuous exposure to hot, humid conditions around retort. For this purpose, pentachloro phenol* was used. If preferable to have the treating done commercially, a process called "Wolmanizing" (American Lumber & Treating Co.) is claimed to fulfill the need.

The plaster laths are approximately 1½ in. wide and ⅜ in. thick. They are purchased in bundles of 50 pieces, 4-ft. long, at a cost of $1.35 a bundle. Corners of the frame are strengthened by nailing the laths to wooden blocks cut from a 2x2-in. piece to a 1½-in. height. Coated 4-penny or lath nails were used for the corners, and the aluminum foil was attached to the frame by No. 6 carpet tacks. The face could be more easily stapled, and aluminum staples would be preferable because they would not induce corrosion in the foil .

Right angle in the frame assembly was formed by connecting the two wooden frames by steel (or aluminum) bands of sufficient length to allow one frame to cover half of the top section between the beams and the side. Other side and half of the top for the section was covered in the same manner. Bottom was covered by a rectangular fabricated frame by hanging this on hooks and eye screws on the side frames, thus encircling the entire retort at this section.

Prior to installation, openings were cut in the pre-fabs to allow reconnecting pipes, gages, bulbs, and plugs in the retort. This also gave accessibility in case of future need for repairs.

Problems Faced

Time saved in insulating the retorts by using pre-fabs was quite substantial, but fabrication time still was much too great because each section had to be custom made. On a hand-made basis, this required a day per four sections per man. Eleven sections are required per retort.

It took two men a day to apply the pre-fabs to a retort. It should be kept in mind, however, that space between retort being fabricated and one adjacent to it was less than 1 ft. at some points. Also it should be pointed out that these particular retorts were mounted on "I" beams which, in turn, were set on concrete blocks giving an overall height of retort bottom from the floor of 10-18 in., depending upon pitch of floor.

To complicate matters, drainage and feed pipes ran close to retort bottom, making it even more difficult to fit the bottom insulation. However, pre-fab sections would be very feasible for a non-cramped plant layout (see photo).

For a retort insulated with pre-fab sections, surface temperature was reduced from 183 to 120 F.

It would have been reduced even further, except that aluminum extending over the frame edge and spliced to the aluminum covering of the adjacent frame was allowed to contact the hot reinforcing body beams on all four sides.

Contact between aluminum and retort should be prevented by cementing an asbestos pad to retort at point of contact. In spite of contact in this case, equilibrium-heat loss was reduced to ⅓ of that of the non-insulated value.

In addition to a check on the equilibrium conditions loss, a measurement was made of the total steam consumed during the processing of chili con carne. Total steam was 823 lb. before and 593 lb. after insulation. However, the latter measurement was made when retorts were first run in the morning, thus introducing the additional weight of overnight condensed line steam. With this in mind, it is estimated that the total steam consumption could be cut approximately one half.

Another Installation

To accommodate the most difficult installation conditions, a "knocked-down" assembly was designed. This design incorporates 4- or 8-ft. lengths of formed sheet metal framing, which is either screwed or clipped to the reinforcing beams (see photo). These can be sawed off to any length to accommodate any irregularity in the retort structure. They can be made with a double fold or single fold and "flat" so that the top sheet can slide in the frame channel or be screwed to the flat (Fig. 2).

However, foil did not give the appearance of solidity that might be desired. Therefore, the new design called for either 0.025-in. utility sheeting or a slightly thinner rigidized sheet. Because of added cost, the rigidized sheet is used only for the outside layer and the plain utility sheet or foil for the inside layer.

To prevent damage of the insulation by the swing bolts on the front

(Turn to page 160)

*Sold under tradename Penta WR preservative (Chapman Chemical Co.).

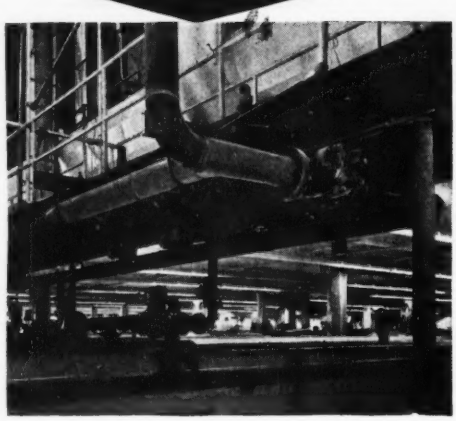
WALWORTH VALVES on the job in the food industry

In addition to the valves described on the facing page, Walworth manufactures a wide range of valves and pipe fittings used extensively in the food industry.

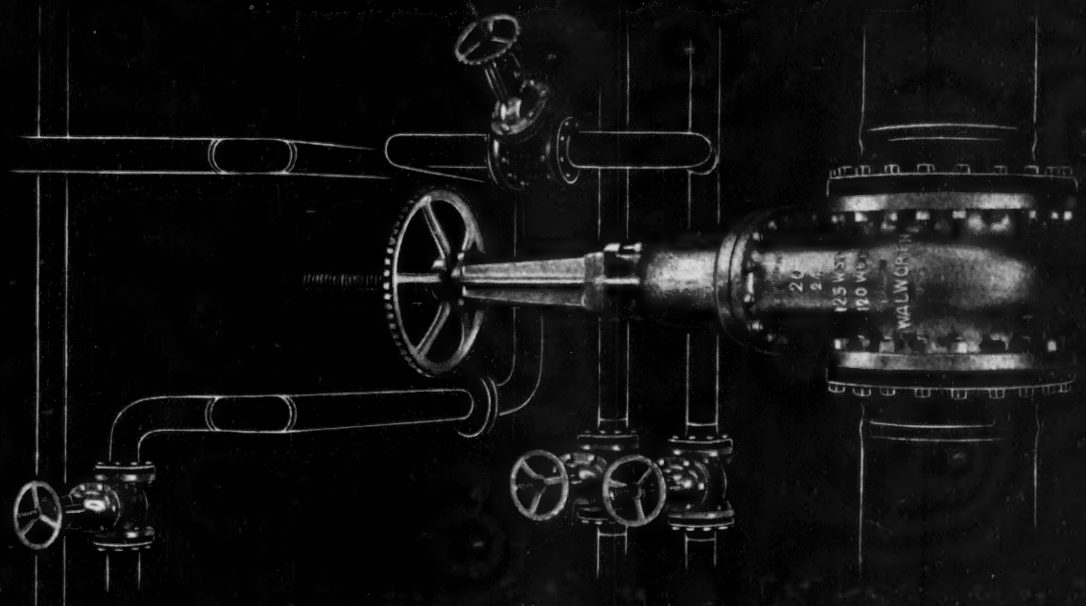
Quick action and tight leakproof sealing qualify Walworth Lubricated Plug Valves for this main gas header feeding band ovens at a new Chicago bakery*.

Other Walworth products include Bronze, Iron, and Steel Valves and Fittings. For complete information, see your nearby Walworth distributor, or, write: Walworth Company, General Offices, 60 East 42nd Street, New York 17, New York.

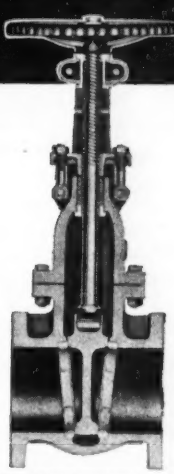
*Name on request



WALWORTH



IRON BODY WEDGE GATE VALVES



Walworth No. 726F OS&Y (Outside Screw and Yoke) Iron Body Wedge Gate Valve. OS&Y valves are recommended for services where it is desirable that the line fluid does not come in contact with the stem threads. Note the swing-type gland-eye-bolts for easy repacking. Sizes 2 to 30 inches.

Better because ...**The entire valve, from handwheel to seat rings, is ruggedly constructed to withstand rough and frequent usage. Body, bonnet, and yoke are sturdy castings with large radius fillets. Dimensions and drilling of end flanges are in agreement with American Cast Iron Flange Standards. Stiffening ribs connect end flanges with the body neck to maintain a rigid connection with piping.**

A wide range of Walworth Iron Body Wedge Gate Valves is available—through your Walworth Distributor—from which you can choose the right type to meet your most exacting conditions. Saddle-type valves as small as ¼-inch; low pressure valves for water and gas pipelines up to 36 inches.

Whenever you need valves and fittings, choose from complete lines—in a variety of metals—manufactured by Walworth. For more information, see your Walworth Distributor or write: Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

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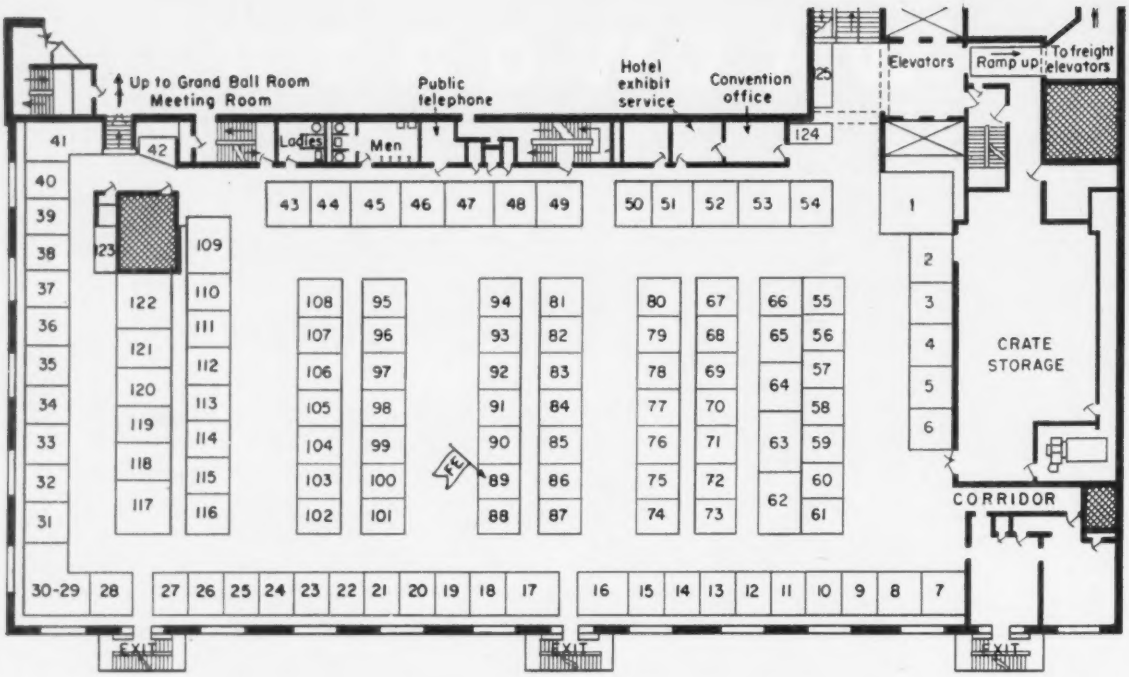
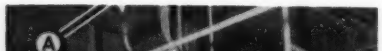


EXHIBITORS AND FLOOR PLAN

American Meat Institute

Annual Meeting, October 8-12, 1954, Palmer House, Chicago

EXHIBITOR	BOOTH
Advance Oven Co.	29-30
Allbright-Nell Co.	7 thru 11
Allen Gauge & Tool Co.	84
Alum. Cooking Utensil Co.	92-93
Amer. Spice Tr. Assn.	½ 36, 37
Anderson Co., V. D.	45
Arkell Safety Bag Co.	117
Atmos Corp.	14
Basic Food Materials, Inc.	43-44
Battle Creek Wrapping Mach. Co.	77-78
Cincinnati Butchers Supply	2-5
Corn Products Sales Co.	88
Crown-Zellerbach Corp.	34-35 ½ 36
Dewey & Almy Chem. Co.	98-101
Dodge & Olcott, Inc.	25-26-27
Dohm & Nelke, Inc.	124
du Pont de Nemours Co., E. I.	15-16
Dupps Co.	115-116
Exact Weight Scale Co.	46
First Spice Mixing Co.	52-53
FOOD ENGINEERING	89
French Oil Mill Machy. Co.	87
General Machy. Corp.	107-108
Globe Co.	55 thru 61
Goodyear Tire & Rubber Co.	85-86
Great Lakes Stamp & Mfg. Co.	19-20 ½ of 21
Griffith Laboratories	81-82
Hayssen Mfg. Co.	102-103
Heller & Co., B.	105
Hercules Fasteners, Inc.	70-71-72
Huron Milling Co.	111
Inland Wire Products Co.	113
Internat'l Minerals & Chem. Corp.	49
Internat'l Salt Co., Inc	114
James Co., E. G.	17-18
Jamison Cold Storage Door Co.	83
Kentmaster Mfg. Co.	66
Koch Supplies	6
Linker Machines, Inc.	64-65
Marathon Corp.	67-68-69
Mayer & Sons Co., H. J.	73
Merck & Co., Inc.	39
Miller Wrap. & Seal. Mach.	31-32-33
Milprint, Inc.	109-110
Morton Salt Co.	38, 123
Niagara Blower Co.	28
Oakite Products Inc.	½ 120, 121
Oppenheimer Casing Co.	24
Pavia Process, Inc.	62
Peters Machy. Co.	90-91
Pfizer & Co., Chas.	125
Pittsburgh Corning Corp.	122
Preservaline Mfg. Co.	47-48
Pure Carbonic Co.	12-13
Seelbach Co., K. C.	104
Sellers Injector Corp.	54
Smith's Sons Co., John E.	95-96
Speco, Inc.	1
Standard Casing Co., Inc.	50-51
Standard Packaging Corp.	40-41-42
Tipper Tie, Inc.	106
Townsend Engineering Co.	79-80
Tranter Mfg., Inc.	97
United Cork Companies	94
Union Asb. & Rubber Co.	112
U S Thermo Control Co.	119, ½ 120
U S Slicing Mach. Co.	½ 21, 22-23
Visking Corp.	74-75-76
Wass Food Products Co.	63
Weber & Co., H. G.	118



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Brilliant polish—at fastest flow rates

QUALITY THAT SPEEDS SALES, by a filtration method that speeds production . . . this double advantage is yours with Celite* diatomite filtration.

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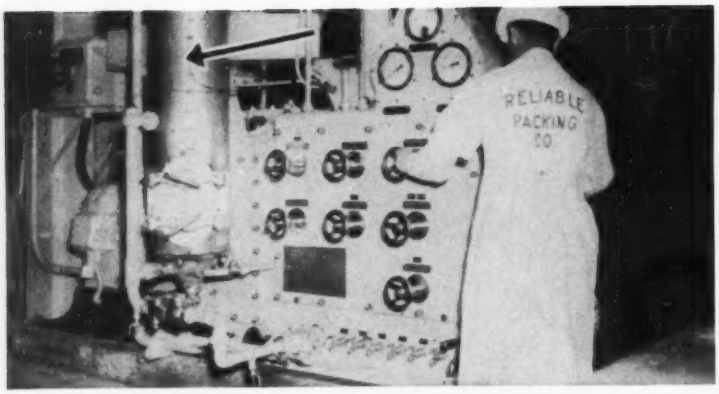
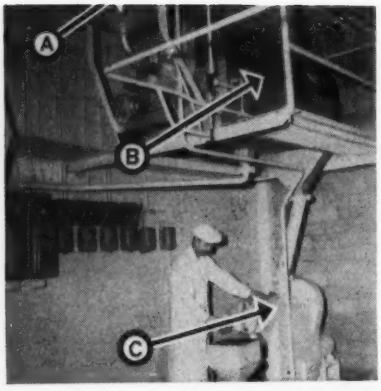
*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products.

JOHNS-MANVILLE JM PRODUCTS

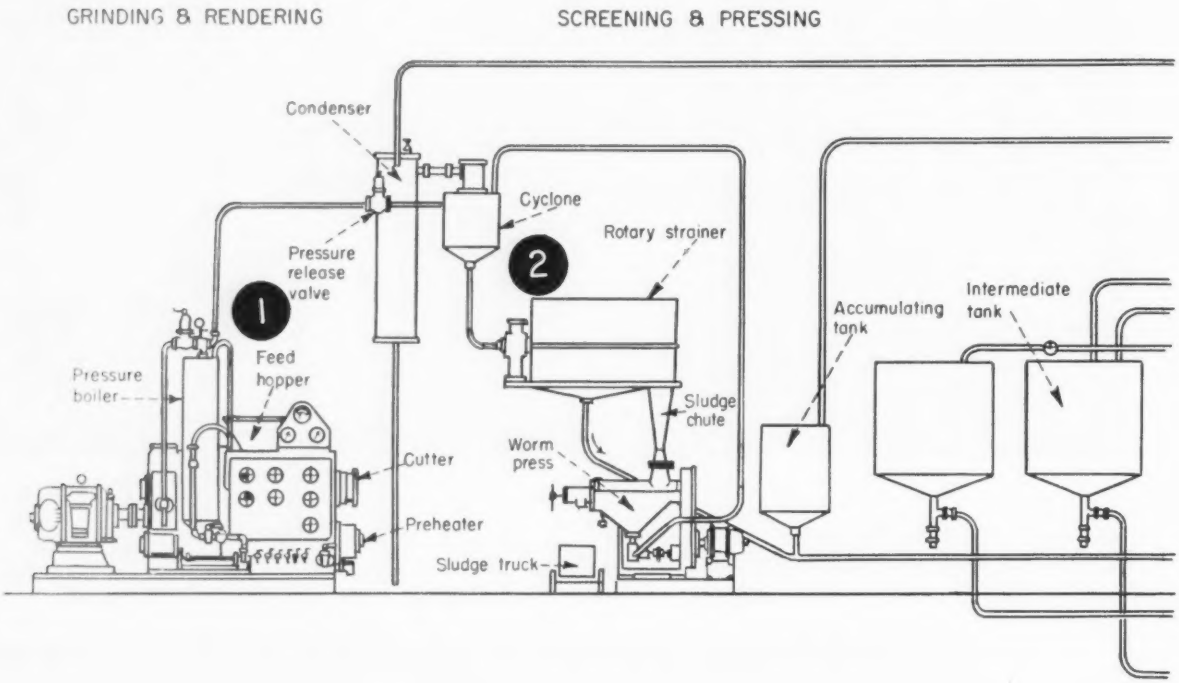
Johns-Manville CELITE FILTER AND PRESSING AIDS



1 **EXPELLER** is actual rendering unit of system. It is comprised of three elements—a mincer, preheater, and boiler (arrow).



2 **FAT** goes to cyclone (A), screen (B); solids to press (C).



Unit Line-Up for Making Superior Lard

Exacting Techniques Mark High-Volume Output in Shorter Process Time

STRAIGHT-THROUGH PROCESSING of top-grade lard is the achievement of Chicago's Reliable Packing Co.

Trimmed fats from the pork-cutting line are ground and charged into the expeller (called "expulser" by the makers)—Point (1) in accompanying diagram. Three stages of rendering take place in this unit, which is a combined hasher and boiler. Self-feeding, the hasher handles 2,800 lb. of raw material hourly.

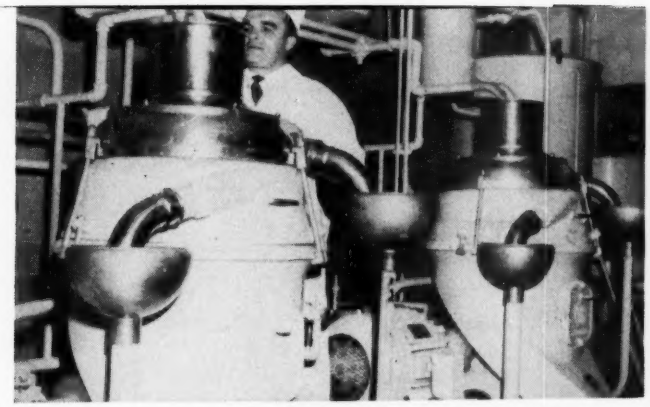
Temperature of minced material is raised to 175 F. in pre-heater. Pulp is then pumped to pressure boiler, where it is heated to 250 F. Next, it is discharged through a release valve and into a cyclone. Sudden drop in pressure releases all the fat from tissues.

There follows straining and pressing—Point (2). Here, boiling pulp is piped to a rotary strainer that separates solids from the fat emulsion. Solids are chuted to a screw-press, and the emulsion passes through the strainer.

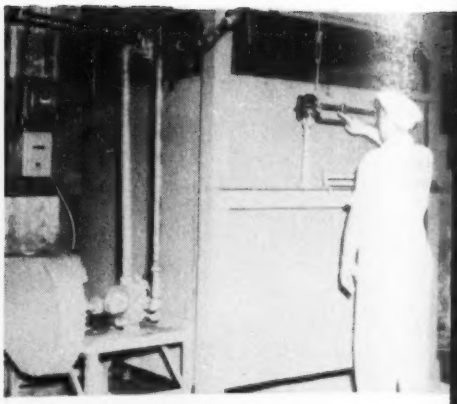
FOR DETAILED APPRAISAL of Reliable's unit operations and significance of continuous line technique, turn to this month's special feature, "Quality Lard Made Continuously," page 72.

Emulsion then is pumped to the contact emulsifier for live-steam treatment (212 F.).

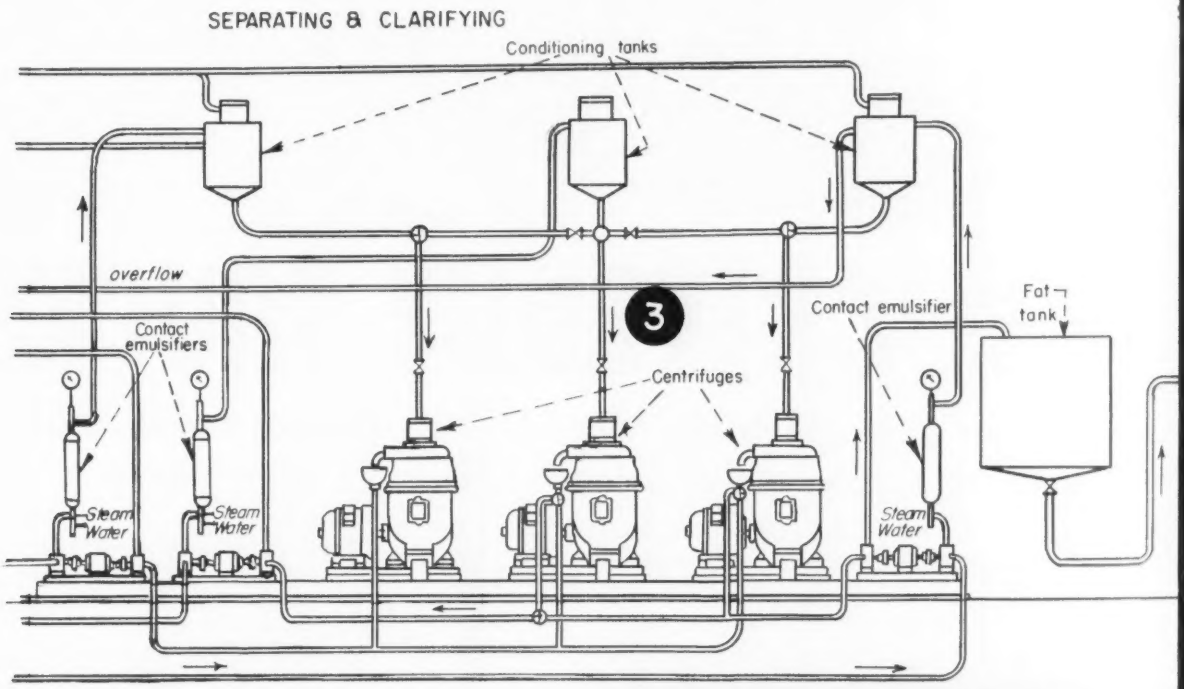
Next steps—Point (3)—are separating fat from water, then clarifying the lard. Employed for separating are two self-cleaning, centrifuge-type units, operating in parallel.



3 **THESE** two centrifugals separate fat from water. System employs three—all self-cleaning. Third (not seen) clarifies fat.



4 **TITAN-REFINED** lard is then check-weighe 6,600 lb.-capacity scale tank.



Following separation, lard passes through a second contact emulsifier, then into a pump that moves it to a third centrifuge for clarification.

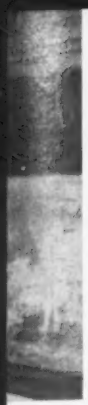
And here the Titan process ends. Total time to this point is about 10 min.

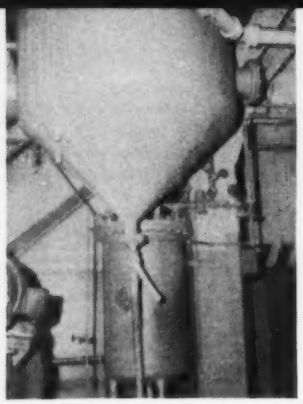
Titan-refined lard now is check-weighed in a 6,600-lb.-capacity scale tank—Point (4). From here, it is pumped into the dryer-deaerator—Point (5)—for a 15 min. period under 20 in. of vacuum. Lard now goes to the blending tank. Then after mixing—Point (6)—with filter cell, it is pressure-filtered (15-20 psi.). Temporary storage in two 6,000-lb.-capacity tanks follows.

Continuous deodorizing in Reliable's specially devised system—Point (7)—is the next step. Lard, heated to 425 F. in a Dowtherm unit, is continuously fed to the deodorizer. It moves downward as steam rises and picks up odoriferous material. Deodorizer operates under 29.9 in. of vacuum, pulled by a three-stage jet ejector. Finally, the deodorized lard is stored in three tanks (total capacity: 58,000 lb.).

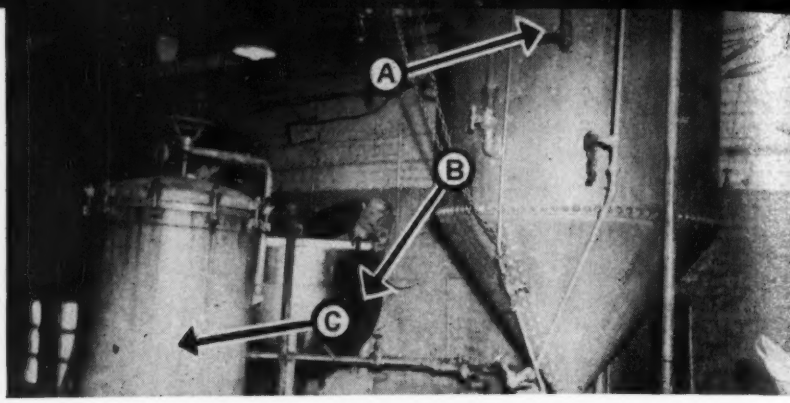
Remaining steps with the product are chill-plasticizing—Point (8)—then filling into drums (380 lb.), tins (50 lb.), cans (3 lb.), and cartons (1 lb.).

9-10 **DRUMS** are filled to 380 net. Below: Cans are filled at 45 per min.



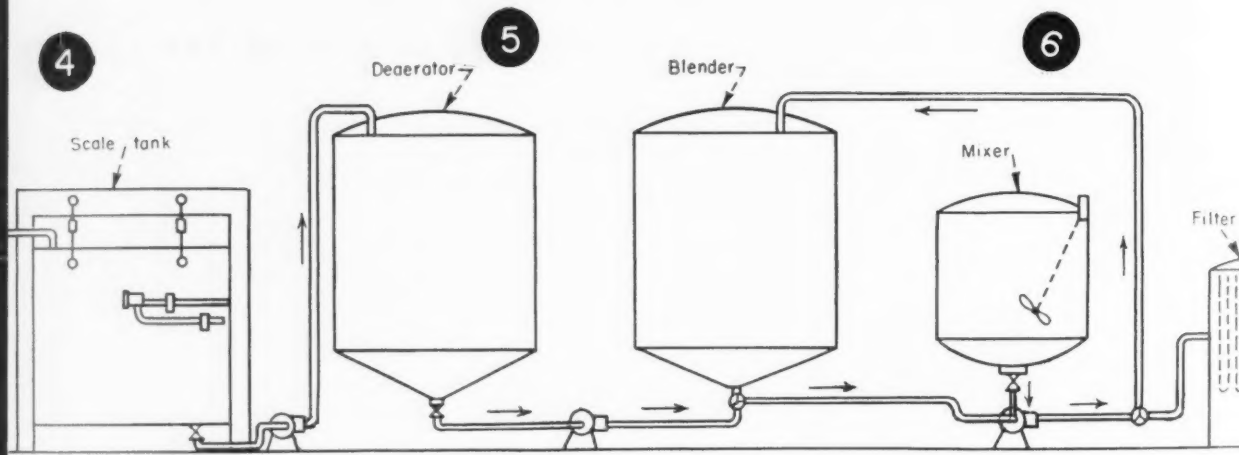


5 **DRYER-DEAERATOR** handles 16,000-lb. every 15 min.

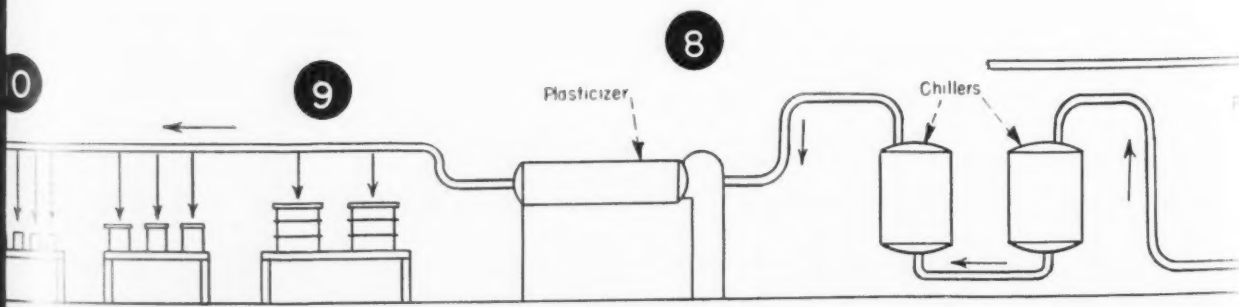


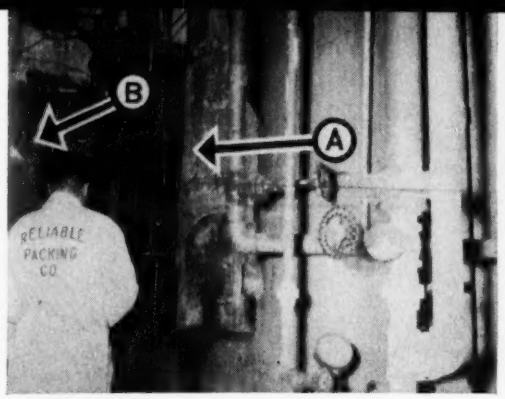
6 **LARD** from 14,500-lb. blending tank (A), is treated with filter aid in 2,000-lb. capacity mixing tank (B) and then goes to pressure filter (C).

SCALING DEAERATING BLENDING FILTERIN

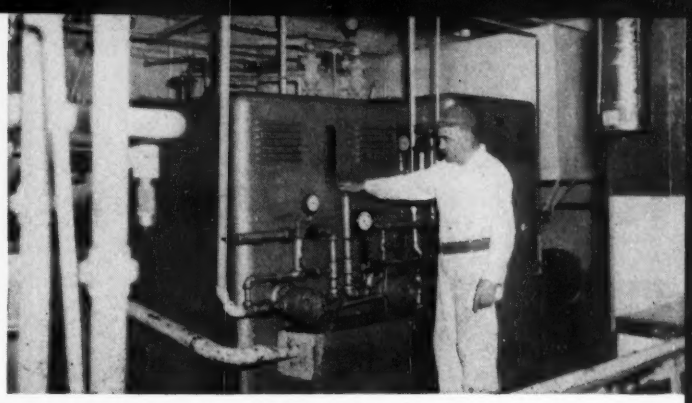


FILLING PLASTICIZING



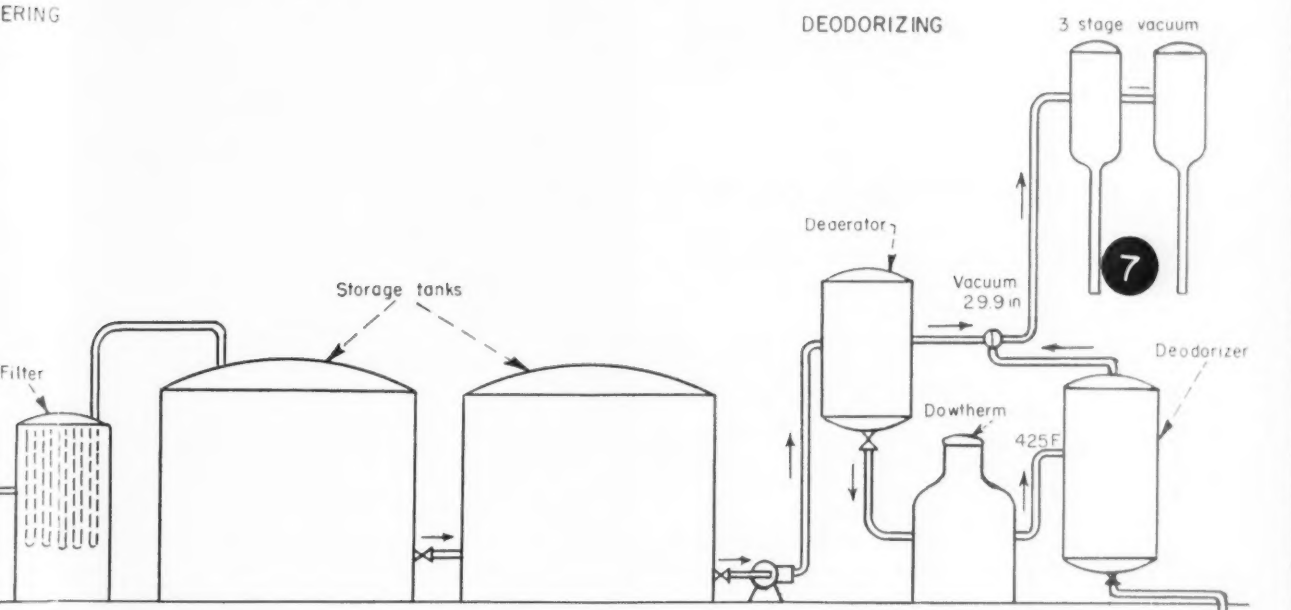


7 DEODORIZER (A), operated under 29-in. vacuum, is fed heated fat from Dowtherm unit (B).



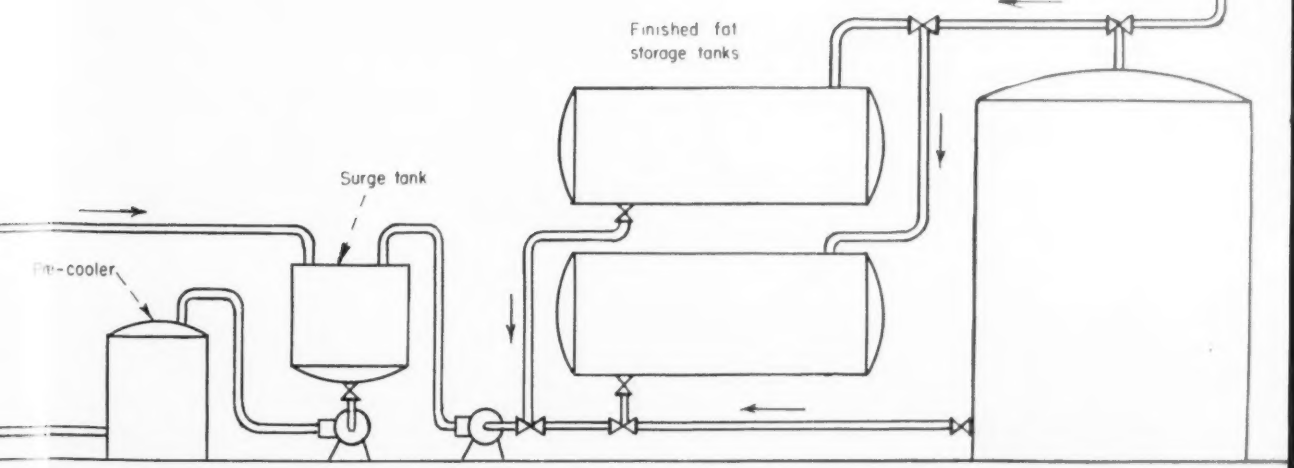
8 VOTATOR, a continuous mixer and heat-exchange unit, chill plasticizes the lard into a smooth, finished product.

ERING



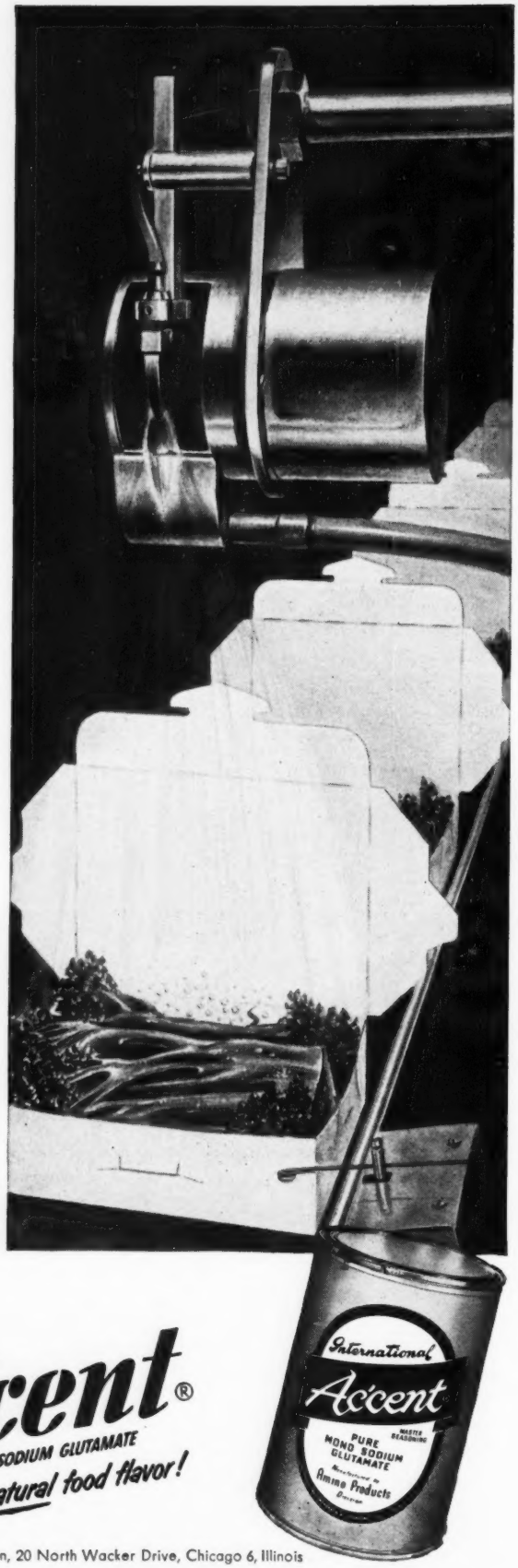
STORING

FE PICTURE FLOWSHEET NO. 69



Here it is!

The new method of adding Ac'cent to frozen vegetables



New Ac'cent Machine gives flavor-edge to frozen foods

Now, after three years in the development stage, a new Ac'cent dispenser makes it possible for frozen vegetable processors to enjoy the flavor enhancement advantages of Ac'cent!

Accurate measurements of monosodium glutamate in a liquid solution are applied by the new machine to vegetables before freezing. It is an automatic, high-speed operation—efficient and economical.

The machine was designed and developed by Ac'cent technical experts in co-operation with a food engineering company. It is able to treat as many as 400 cartons a minute. There is no drip-loss, and it assures *uniform flavor control*. It also is versatile, for it can be used by canners and by processors of other frozen foods.

Use of the new machine brings *two immediate marketing advantages* to the frozen vegetable processor:

1. *Ac'cent*, pure monosodium glutamate, gives the product a distinct flavor advantage—a longer-lasting natural, fresh flavor.
2. *Ac'cent* gives the product a longer shelf-life because of the improved flavor retention.

The successful solution of this processing problem is another example of the help given to many of our customers by the exclusive Ac'cent technical service on new products, timing devices, applicators and a variety of processing problems. New developments from our laboratories have given many of them a lasting competitive advantage.

That's another reason why you should always specify Ac'cent when buying monosodium glutamate. You get so much more when you do!

Ac'cent®
PURE MONOSODIUM GLUTAMATE
...builds natural food flavor!

Full information about the new Ac'cent liquid dispensing machine will be sent upon request.

AMINO PRODUCTS Division of International Minerals & Chemical Corporation, 20 North Wacker Drive, Chicago 6, Illinois

Acetate Solvents, Crude
Acetate Solvents, Pure
Acetic Acid
Acetic Anhydride
Acetone
Acetylene, 15 psi
Air
Alcohols
Aluminum Ch
Aluminum P
Aluminum
Aluminu
Alums
Ammonia Gas
Ammonia Liquors
Ammonium Bisulfite (above 7.0 pH)
Ammonium Carbonate
Ammonium Chloride
Ammonium Hydroxide
Barium Cyanide
Barium Hydroxide
Bariu Sul

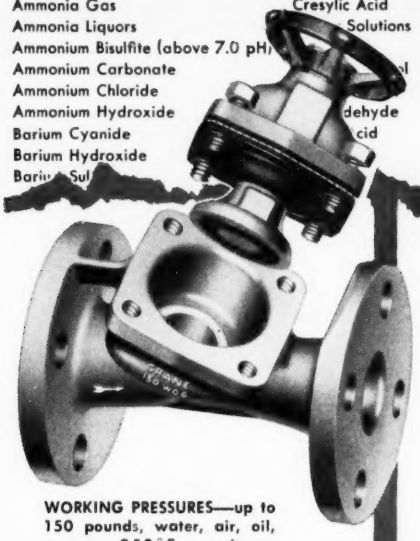
Carbon Dioxide, Dry
Carbon Dioxide, Wet
Carbonic Acid, Carbonated Beverages
Chromic Acid
Chromium Potassium Sulfate
Citric Acid
Coke Oven Gas
Cop de (Cupri
de (Cu s)
ate
Oil
Creosote
Cresylic Acid
Solutions
dehyde
cid

Hydrogen Gas
Hydrogen Peroxide
Hydrogen Sulfide
Iron Chloride (Ferric)
Iron Chloride (Ferrous)
Iron Potassium Sulfate (Ferric Alum)
Iron Sulfate (Ferric)
(Ferrous)
d Lacq
Petroleum Oils, Refined
Phenol (Carbolic Acid)
Phosphoric Acid
ic Acid, Aqueous

Sulfuric Acid
Sulfurous Acid
Tartaric Acid
Tin Chloride (Stannic)
Tin Chloride (Stannous)
Sulfate (Stannic)
Sulfate (Stannous)
Water, Acid Mine Waters
Water, Boiler Feed
Water, Distilled, Laboratory Grade
Water, Distilled, Return Condensate
Wate ire Prot ion Equipment
nicipal
Water, Fresh, Industrial Supplies
Water, Saline, Sea Water, etc.
Zinc ride

Name your poison

or any hard-to-handle fluid



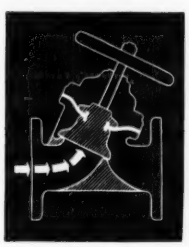
WORKING PRESSURES—up to 150 pounds, water, air, oil, or gas, 250°F. maximum temperature, depending on valve size, materials, and service.

CRANE HAS THE BETTER VALVE FOR IT!

Better because they're safer, easier to operate. *Better* because they reduce maintenance to a negligible degree. And that holds true for just about any service, any fluid within rated pressure and temperature.

For Crane now offers the revolutionary diaphragm valve in a new wide choice of body, disc insert and diaphragm materials—in unlined or lined patterns. You specify whatever combination best suits your particular need. The regular line-up includes brass, cast iron, aluminum, or 18-8 SMo body and disc . . . with diaphragm and disc insert of Neoprene, Buna N, Kel -F, or natural rubber. Regular linings are Neoprene or hard natural rubber. Also sliding stem valves for automatic operators of all types. In addition, Crane Diaphragm Valves are regularly available for high-vacuum service, or oxygen and acetylene usage. Other body and disc materials, as well as linings, available on special order. Sizes from ½ to 6-inch.

HOW CRANE DIAPHRAGM VALVES WORK



The Crane diaphragm serves one function only—sealing the bonnet. It is not subject to crushing and rapid wear. The seating member is a separate circular flat face disc, firmly attached to the stem and joined to the diaphragm with a special leak-proof connection. This independent seating feature permits positive shut-off with no loss of fluid, even in case of diaphragm failure.

NEW LITERATURE . . . NEW FILM

Get complete, interesting facts about the expanded line of Crane Packless Diaphragm Valves in a new 24-page folder . . . and a new sound movie. You'll see how this revolutionary valve solves flow control problems where others fail. Check with your local Crane Representative, or use the coupon below.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Illinois

Gentlemen:

I would like to arrange for a free showing of the Crane Diaphragm Valve Film ( ).

I would like a copy of Diaphragm Valve Folder ( ).

Name .....

Company .....

Address .....

City ..... Zone ..... State .....

CRANE CO.

General Offices: 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

Use coupon on page 227.

NEW CHEVROLET TRUCKS

shorten your schedules and cut costs in the bargain!

You can actually count on a Chevrolet truck doing your job faster and for less money. That's a strong claim, sure; but one that's been proved time after time on job after job.

EXTRA POWER SAVES YOU TIME

All three Chevrolet truck engines—the "Thriftmaster 235," the "Loadmaster 235" and the "Jobmaster 261"*—deliver extra horsepower for greater acceleration and hill-climbing ability. You haul your loads on a time-saving schedule and save money doing it—for with Chevrolet's higher compression ratio you use less gas.

BUILT-IN RUGGEDNESS SAVES YOU MONEY

Stronger, more rigid frames, newly designed clutch; huskier rear axles and drive lines in 2-ton models; higher capacity universal joints in medium- and heavy-duty models—these beefed-up built-in chassis features mean your Chevrolet truck is going to stay on the job for a longer time. They also mean you can expect extra-low operating costs.

Another important advantage is Chevrolet's low original cost—lowest of all lines of trucks! You save the day you buy, and you go right on saving as long as you own that Chevrolet truck. Drop by your Chevrolet dealer's and look over the many models he has to offer. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

MOST TRUSTWORTHY TRUCKS ON ANY JOB! CHEVROLET

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

THREE GREAT ENGINES—The new "Jobmaster 261" engine* for extra heavy hauling. The "Thriftmaster 235" or "Loadmaster 235" for light-, medium- and heavy-duty hauling. **NEW TRUCK HYDRA-MATIC TRANSMISSION***—offered on ½-, ¾- and 1-ton models. Heavy-Duty **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **DIAPHRAGM SPRING CLUTCH**—improved-action engagement. **HYPOID REAR AXLE**—for longer life on all models. **TORQUE-ACTION BRAKES**—on all wheels on light- and medium-duty models. **TWIN-ACTION REAR WHEEL BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—greater holding ability on heavy-duty models. **NEW RIDE CONTROL SEAT***—eliminates back-rubbing. **NEW, LARGER UNIT-DESIGNED PICKUP AND PLATFORM STAKE BODIES**—give increased load space. **COMFORTMASTER CAB**—offers greater comfort, convenience and safety. **PANORAMIC WINDSHIELD**—for increased driver vision. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—easier, safer handling. **ADVANCE-DESIGN STYLING**—rugged, handsome appearance.

**Optional at extra cost. Ride Control Seat is available on all cabs of 1½- and 2-ton models, standard cabs only in other models. "Jobmaster 261" engine available on 2-ton models, truck Hydra-Matic transmission on ½-, ¾- and 1-ton models.*

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50 years

1904 - 1954

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"Silent Partners in Famous Foods"®

WM. J. STANGE CO. • CHICAGO 12, ILLINOIS • OAKLAND 21, CALIFORNIA
CANADA: STANGE-PEMBERTON, LTD. • NEW TORONTO, ONTARIO
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GAIR can help PROMOTE YOUR PRODUCT

with eye-appeal PRINTING

Attractively printed Gair shipping boxes double as sales promotion aids—giving prominent display to brand names while traveling through the channels of distribution. Prospects along the way—from factory to warehouse, to store, to home—see these sales messages.

Look around. You'll notice that products from paints to peanuts, from soaps to stoves carry colorful, well-printed identification on their shipping boxes.

What about yours?

Remember, this traveling display is economical. You own the "billboards". . . for just the cost of plates and printing you add a strong link to your promotional chain.

To learn how your shipping box can double as a sales promotion aid, check with the Gair plant nearest you. Learn, too, how Gair's assured supply source, engineering ability and delivery service help give you the best in corrugated or solid fibre shipping boxes.

Ask for a copy of the Shipping Case Handbook.

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NO. TONAWANDA, N. Y. • PHILADELPHIA, PA. • PORTLAND, CONN. • RICHMOND, VA. • SYRACUSE, N. Y. • TETERBORO, N. J.

GAIR

SHIPPING CONTAINERS
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PAPERBOARD

ROBERT GAIR COMPANY, INC. • 155 EAST 44th STREET • NEW YORK 17

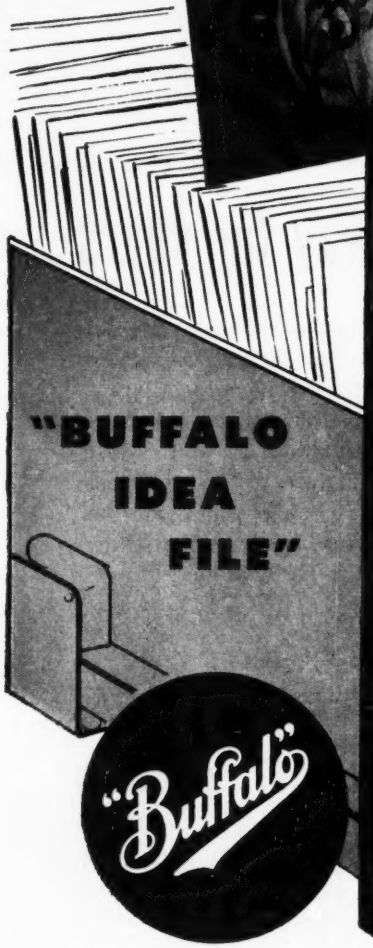
In The "Buffalo" Fan Balancing Room

THE IMPORTANCE OF MAINTAINING BALANCE OF FAN WHEEL

PROBLEM:
excessive vibration in exhaust fan delivering dust-laden air to cyclone. Fan operated smoothly a number of years, but gradually developed vibration and finally damaged the bearings.

SOLUTION:
Fan Wheel found to be far out of balance due to uneven buildup of slightly moist dust particles on blades. Fan rotor had never been cleaned, and had condition been permitted to continue, further bearing troubles and a sprung shaft might have resulted. "Buffalo" representative advised owner to clean rotor every six months, then check wheel balance. Fan has since operated smoothly, with no further bearing trouble, and at greatly reduced noise level. NOTE: all "Buffalo" fan rotors are balanced both statically and dynamically on precision balancing machines at the factory. Regular periodic cleaning and repainting followed by a balance check will assure added years of smooth, efficient performance.

This is one of the thousands of problem-solution case histories accumulated in "Buffalo" files during our 77 years of building air handling equipment and solving air problems for industry. Call your nearest Buffalo Engineering Sales Representative—get the benefit of his factory trained "know-how" and experience to help you solve your air problems.



Write for Maintenance Data Booklet 3426.

BUFFALO FORGE COMPANY
152 MORTIMER ST. BUFFALO 4, N.Y.
Publishers of "Fan Engineering" Handbook
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
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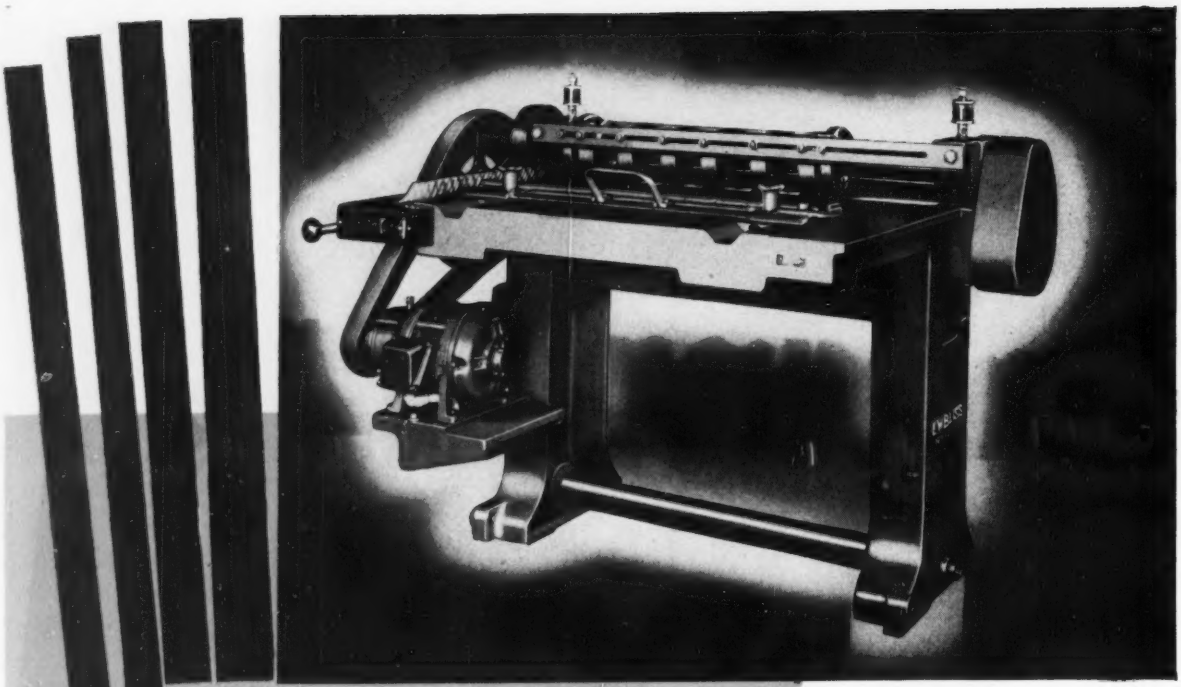
VENTILATING FORCED DRAFT AIR CLEANING COOLING AIR TEMPERING HEATING INDUCED DRAFT PRESSURE BLOWING EXHAUSTING



BLISS Gang Slitters

Built to slit straight, fast and true...

and stay that way for years

Whether you want to prepare blanks for can bodymakers, cut strips for strip feed presses, or trim sheets for litho machines, you can pay more but you can't buy better than Bliss.

These rotary-type cutters are engineered to yield consistent, accurate slitter output. Solid one-piece bearings, heavy frames and heavy-duty precision end thrust bearings combine to give the accuracy you need—and give it hour in and hour out over years of steady production.

Cutters may be set up to shear on either edge, and can be furnished with fixed or adjustable hubs, in standard or narrow widths. A grinding attachment which sharpens the cutters in place is available as are a wide selection of special gages.

If you want accurate, dependable slitter production, the Bliss Gang Slitters are worth investigating. A Bliss Sales Engineer will be glad to help you choose the proper set-up for your production. Meanwhile, for more information about slitters and other equipment in the Bliss line, write for Catalog 36-A.

E. W. BLISS COMPANY
50 Church St., New York 7, N. Y.

BLISS on your machine is more than a name... *it's a guarantee*

BLISS CAN AND CONTAINER MAKING MACHINERY

SLITTERS

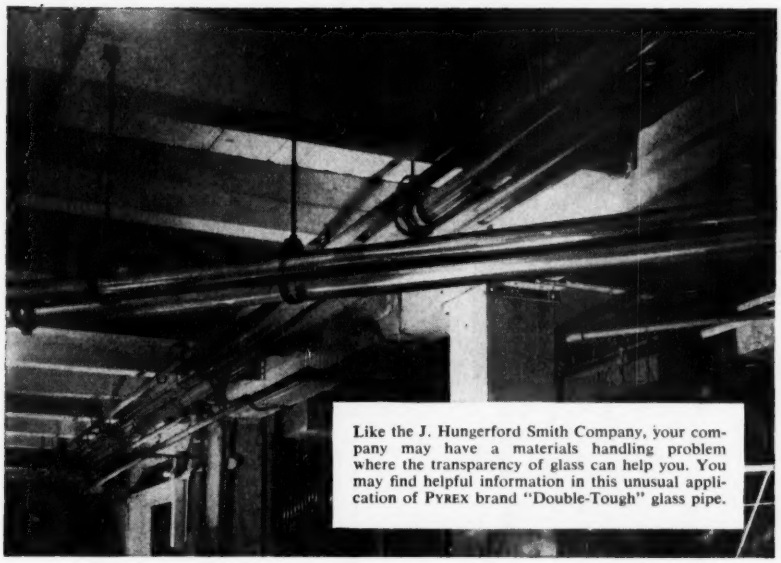
BODYMAKERS

FLANGERS

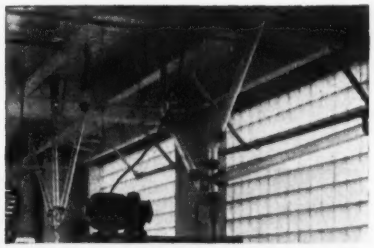
SEAMERS

TESTERS

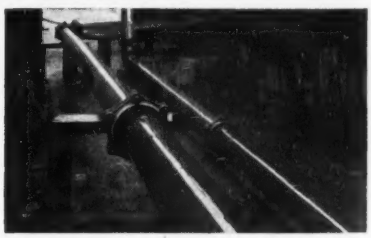
STRIP FEED PRESSES



Like the J. Hungerford Smith Company, your company may have a materials handling problem where the transparency of glass can help you. You may find helpful information in this unusual application of PYREX brand "Double-Tough" glass pipe.



Because PYREX pipe is easy to clean *in place*, you can switch quickly from one product to another. And the smooth surface of PYREX brand glass pipe offers no collecting places for materials that might threaten product purity.



Detail of PYREX pipelines handling cherries from outside tank storage to processing (left) and returning storage solution to tanks (right).

Materials handling innovation

How this PYREX® pipe installation does the work of 5 men

It once took five men plus an elevator operator and a truck driver most of a day to move 70 barrels of cherries from outside storage to the start of the processing line.

This was the materials handling problem facing Carvel Martin, manager of J. Hungerford Smith's Rochester, N. Y., plant—a large producer of syrups and fruits for the fountain trade and ice cream manufacturers.

Two years ago, the company installed the PYREX pipeline shown in part above. Now cherries flow as fast as processing can handle them and only *two* men do the job.

In addition, the cherries travel in greater safety. Spoilage and damage due to improper handling have been eliminated. Materials handling has been cut to the bone. And the system paid for itself in less than one season.

No wonder Carvel Martin calls the performance of this PYREX pipeline "Spectacular."

Transparency made it possible

Pipes of other materials were tested before PYREX brand "Double-Tough" glass pipe was chosen. None proved practical. PYREX pipe was ideal because of its transparency. Operators can watch flow at all times at any point in the line. If stoppage occurs, it can be instantly detected.

Proof of satisfaction

A second even more extensive PYREX pipe system has been installed to transfer cherries from inside barrel storage to initial processing. Six hundred feet long, the new line carries cherries in 3-inch pipe from one end of the plant to the other. A parallel line acts as a return for the storage solution.

Other PYREX installations in this plant handle syrups, flavorings and fruits.

Important advantages for food processors

PYREX *pipe guards product purity.* Its mirror smooth surfaces have no pits or hollows to collect contaminating deposits. Joints are tight with no space between pipe ends to gather sediment.

PYREX *pipe is easily cleaned in place.* A detergent solution followed by water or low pressure steam flushing removes all traces of past contents. Thus it's easy to change over quickly to different products, using the same PYREX lines.

PYREX *pipe's durability* is exceptional, reports Mr. Martin. There has been no breakage and no replacement due to wear, even under operating temperatures of 190° and 200°F. Installation, too, is easy. All of the J. Hungerford Smith PYREX piping is installed by factory maintenance men without special training.

Which do you need most?

Non-corrosion . . . non-contamination . . . visibility . . . ease and speed of cleaning . . . durability . . . economy? You get them all with PYREX pipe.

For detailed information, with pictures and diagrams, mail the coupon below. Or, for answers to your questions on PYREX *pipe applications right in your own factory, contact the Corning Distributor nearest you.*

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Corning means research in Glass

PYREX

CORNING GLASS WORKS

59 Crystal St., Corning, N. Y.

Please send me your new PYREX brand "Double-Tough" glass pipe catalog.

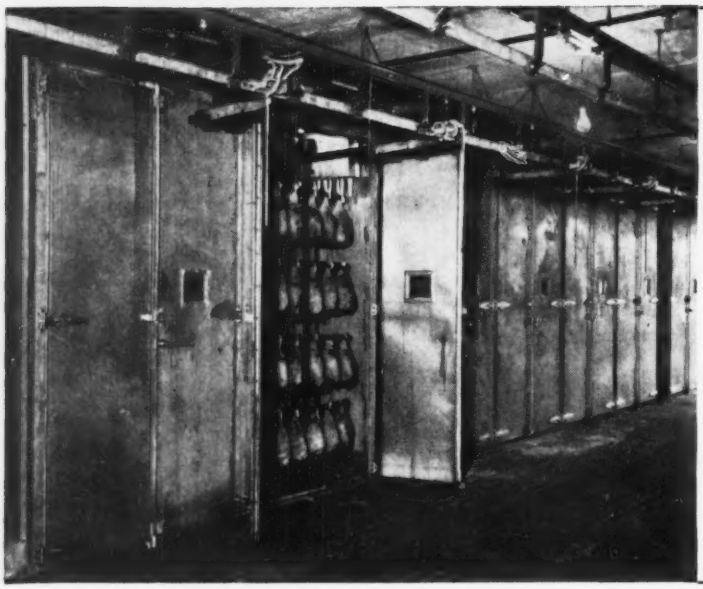
Name..... Title.....

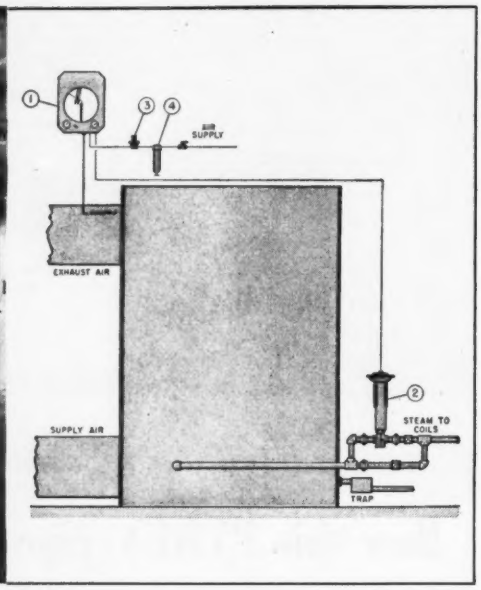
Company.....

City..... Zone..... State.....

Use coupon on page 227.

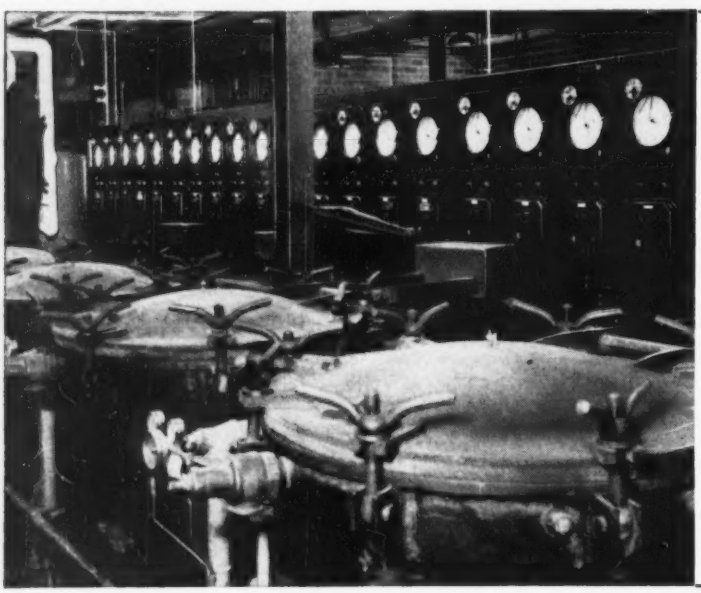
DEPENDABLE TAYLOR

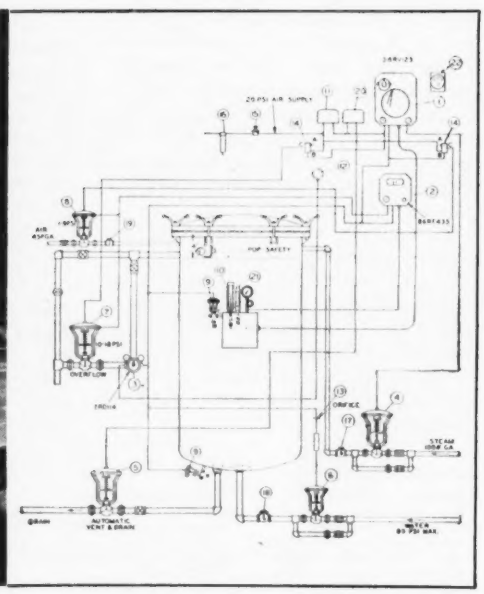




Taylor Smokehouse Control System gets the most out of every smoked product. While assuring maximum product weight consistent with uniform palatability, it helps hold smoking time and operating costs to a minimum too.

Here's how it works: A Taylor FULSCOPE* Recording Temperature Controller precisely holds the required temperatures in each house, using a dry bulb only. A second thermal system may be used to record the internal temperature of a sample product.





This battery of retorts is automatically operated at maximum capacity by Taylor FULSCOPE Controllers with Process Timers. The operator simply pushes a start button and this Taylor SP6A (Steam Cook, Pressure Cooling) system gives: Automatic Venting; Automatic Temperature Control At Processing Point; Automatic Timing Of Process Period; Automatic Pressure Control During Cooling; Consistent, Uniform Cooling To A Specified Temperature; Termination Of Cooling At A Specified Point (with automatic blow-down and drain of retort); Signal Flash Telling Operator Cycle Is Completed.

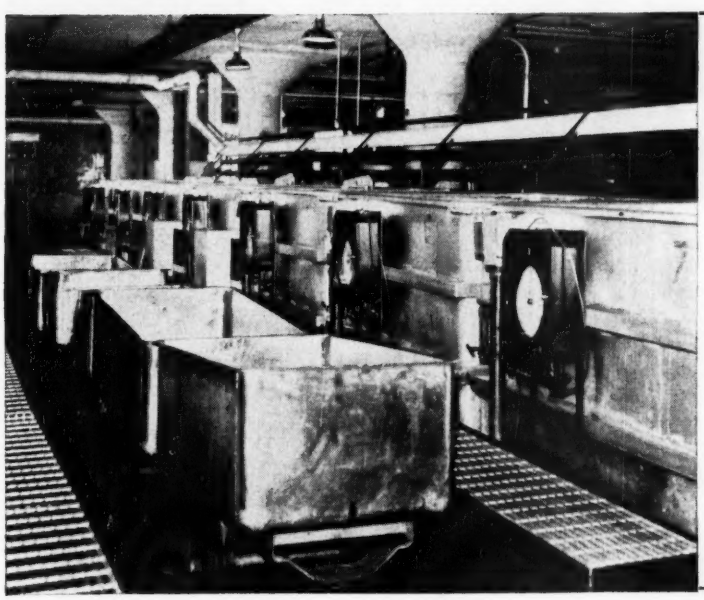
CONTROLLERS SAVE YOU MORE THAN MONEY

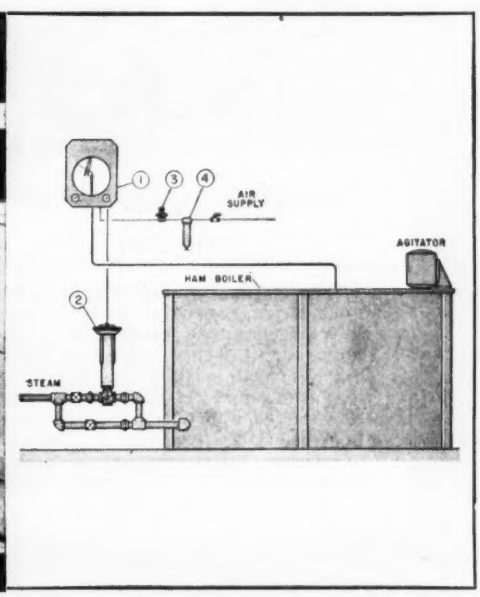
THEY may even save your reputation . . . by helping to assure that your product is always all that you advertise it to be. When your good name—and future business—depends on consistently high quality you can't afford to run the risk of human error in your processing operations.

Taylor control systems like those shown are giving efficient, dependable performance to packers throughout the country. There are Taylor designed systems for Scalding Tanks, Dehairers, Depilators, Hot Water Systems, Washers, Casing Soakers, Ovens, Chill Rooms, Meat Cutters, Sausage Mixers, Jourdan Cookers, Lard Renderers, Coolers, Evaporators and Air Conditioners.

The cost of installing Taylor automatic controls is probably less than you think—in many cases the system pays for itself within a year through savings in operator time. Your Taylor Field Engineer is fully qualified to advise on your problems and give you an estimate. Or write for **Catalog 500MP.** Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

Taylor Instruments MEAN ACCURACY FIRST





Taylor Temperature Control on these Ham Boilers cuts operating costs by reducing steam consumption and operator time; insures minimum shrinkage by automatically holding processing temperature to exact requirements; means product uniformity because every ham is boiled at the same temperature. Accurate chart records are produced by a Taylor FULSCOPE Limited Range Recording Controller to show the exact time and temperature of the boiling of each batch.

*Reg. U.S. Pat. Off.

Use coupon on page 227.

PROVED RESULTS

COOKED SAUSAGE PRODUCTS HAVE BETTER CURE-COLOR . . . SMOKEHOUSE TIME IS REDUCED WITH

CEBICURE

(MERCK ASCORBIC ACID)

YOU'RE SURE WITH CEBICURE

CEBICURE is the Ascorbic Acid developed by the Merck Research Laboratories specifically for curing meats. Because of its special particle size, CEBICURE is free-flowing and dissolves rapidly in cold water. CEBICURE is supplied in convenient avoirdupois packages. It is shipped with transportation prepaid from Atlanta, Ga.; Buffalo, N. Y.; Chicago, Ill.; Dallas, Texas; Los Angeles, Calif., Rahway, N. J.; St. Louis, Mo., Seattle, Wash.

See the difference CEBICURE can make in curing cooked sausage products. Establish CEBICURE as a standard curing ingredient.

From a sales standpoint, CEBICURE gives your products more appetizing color — increased eye appeal — and protection against color-fading.

Send for technical bulletin describing preparation of salt solutions with added Ascorbic Acid.

Use of Ascorbic Acid in cooked sausage products is approved by B. A. I.

Under the name "Cebitate" Merck also offers Sodium Ascorbate especially for use in curing meat.

Research and Production for the Nation's Health

MERCK & CO., INC.
Manufacturing Chemists
RAHWAY, NEW JERSEY

Converters of VISQUEEN film are leading experts in design and manufacture of flexible packages. Their skills are backed by VISKING's technical knowhow. Let them help you obtain better packaging. The coupon will bring names of those serving your area.

for moisture control in packaging specify

VISQUEEN® film

When moisture is a problem, you will profit by investigating packages of VISQUEEN polyethylene film. VISQUEEN locks out unwanted moisture—maintains any required moisture balance within the package. VISQUEEN "C", specially treated for printing, also provides an excellent surface for permanent brand display.

Important! VISQUEEN film is all polyethylene, but not all polyethylene is VISQUEEN. VISQUEEN film is produced by process of U. S. Patents No. 2461975 and 2632206. Only VISQUEEN has the benefit of research and technical experience of The VISKING Corporation, pioneers in the development of pure polyethylene film.

VisQueen® film... a product of

THE VISKING CORPORATION

World's largest producers of polyethylene sheeting and tubing

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In Canada: VISKING Limited, Lindsay, Ontario
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call for the experts

The VISKING Corporation, Box R9-1410
Plastics Division, Terre Haute, Indiana

Send me names of converters of VISQUEEN film serving my area.

Name_____

Company_____

Address_____

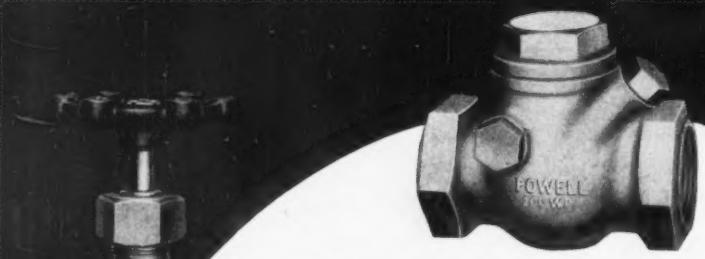
City_____ Zone____ State_____

Use coupon on page 227.

MEAT SPECIAL

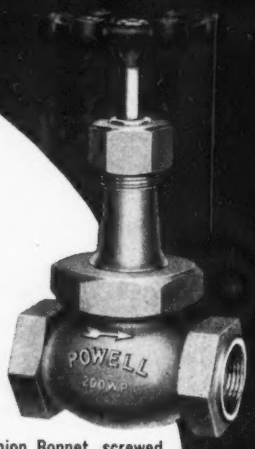
NOW! For Immediate Delivery!

MONEL* and NICKEL VALVES



Screwed-in Cap, screwed end Swing Check Valve for 200 W. P.

Screwed-in Bonnet, Screwed end, rising stem Gate Valve for 200 W. P.



Union Bonnet, screwed end Globe Valve for 200 W. P.

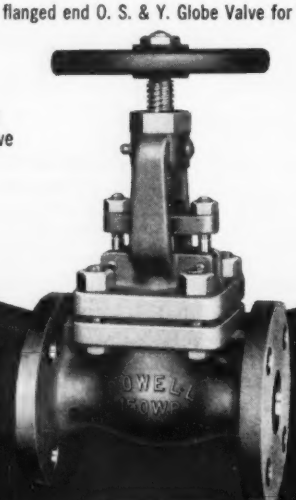
HERE ARE shown a few Powell Monel Metal and Nickel Valves in stock, that can be shipped immediately on receipt of order. They are made with screwed or flanged ends, for 150 and 200 W. P. at 500° F. Sizes range from ¼" to 30".

Solid or double wedges for Gate Valves are interchangeable, precision-fitted, and accurately guided throughout their entire travel.

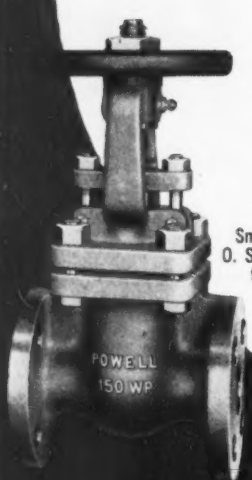
These valves conform to latest A.S.A. and M.S.S. Standards. End flanges will be furnished with plain faces. Raised, ring joint, male and female, or tongue and groove faces can be supplied on special order.

For the full details write The Wm. Powell Company
Cincinnati 22, Ohio

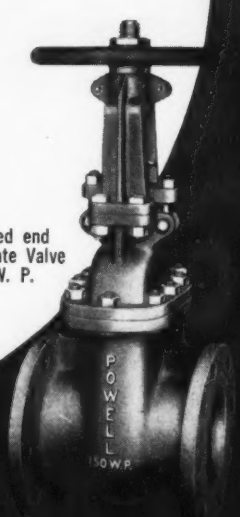
Small flanged end O. S. & Y. Globe Valve for 150 W. P.



Small flanged end O. S. & Y. Gate Valve for 150 W. P.



Large flanged end O. S. & Y. Gate Valve for 150 W. P.



** Registered trade name of The International Nickel Co.*

Powell Valves

108th year

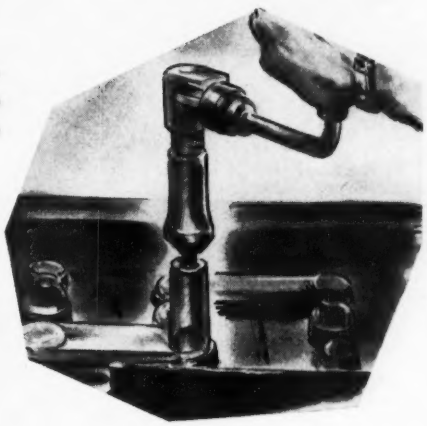
"DO-IT YOURSELF" MAINTENANCE TIPS
from the GOULD Plus-Performance Plan

HERE'S MONEY-SAVING MAINTENANCE TIP #1

Accidental damage in even the best regulated operations can put a cell out of commission. Here's a tip from the Gould Plus Performance Plan on how to easily remove and repair a cell.

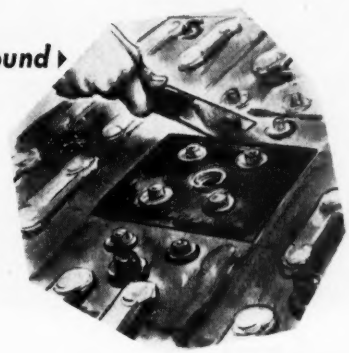
1. Remove Connectors ▸

We recommend using a special drill (Gould Part No. 35459C) which allows the cell post to remain by cutting the bond to the lead insert of the cover.



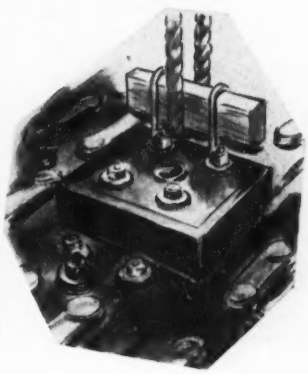
2. Remove Compound ▸

from between jar to be removed and adjacent cells. Use a warm compound knife for this purpose. Pour a little penetrating oil or kerosene mixed with regular oil into space between cells for lubricant.



3. Pull the Cell ▸

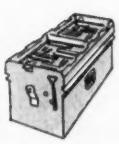
The best way is to screw a Gould Cell Puller (Part Number 77061) to the negative post remaining after drilling in No. 1. Then attach hoist and lift. If a cell has two negative posts, use two cell pullers, attaching the hoist to a piece of wood placed through the cell puller loops.



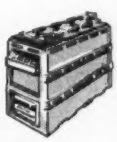
GOULD Batteries

GOULD-NATIONAL BATTERIES, INC.
TRENTON 7, N. J.

For Railroad Air Conditioning and Lighting


For Mine Shuttle Cars and Locomotives

For Electric Industrial Trucks


For Diesel Locomotive Starting

For Standby and Emergency Power

©1954 Gould-National Batteries, Inc.

Always Use Gould-National Automobile and Truck Batteries

This is only one example of the many helpful service tips contained in the Gould Plus-Performance Plan. For the complete set of published information on battery service and maintenance mail the coupon TODAY.

BATTERY INFORMATION HEADQUARTERS
Dept. FE-94 Trenton 7, N. J.

Please send me, without charge or obligation, the Gould Plus-Performance Plan for _____ batteries.
(type or types)

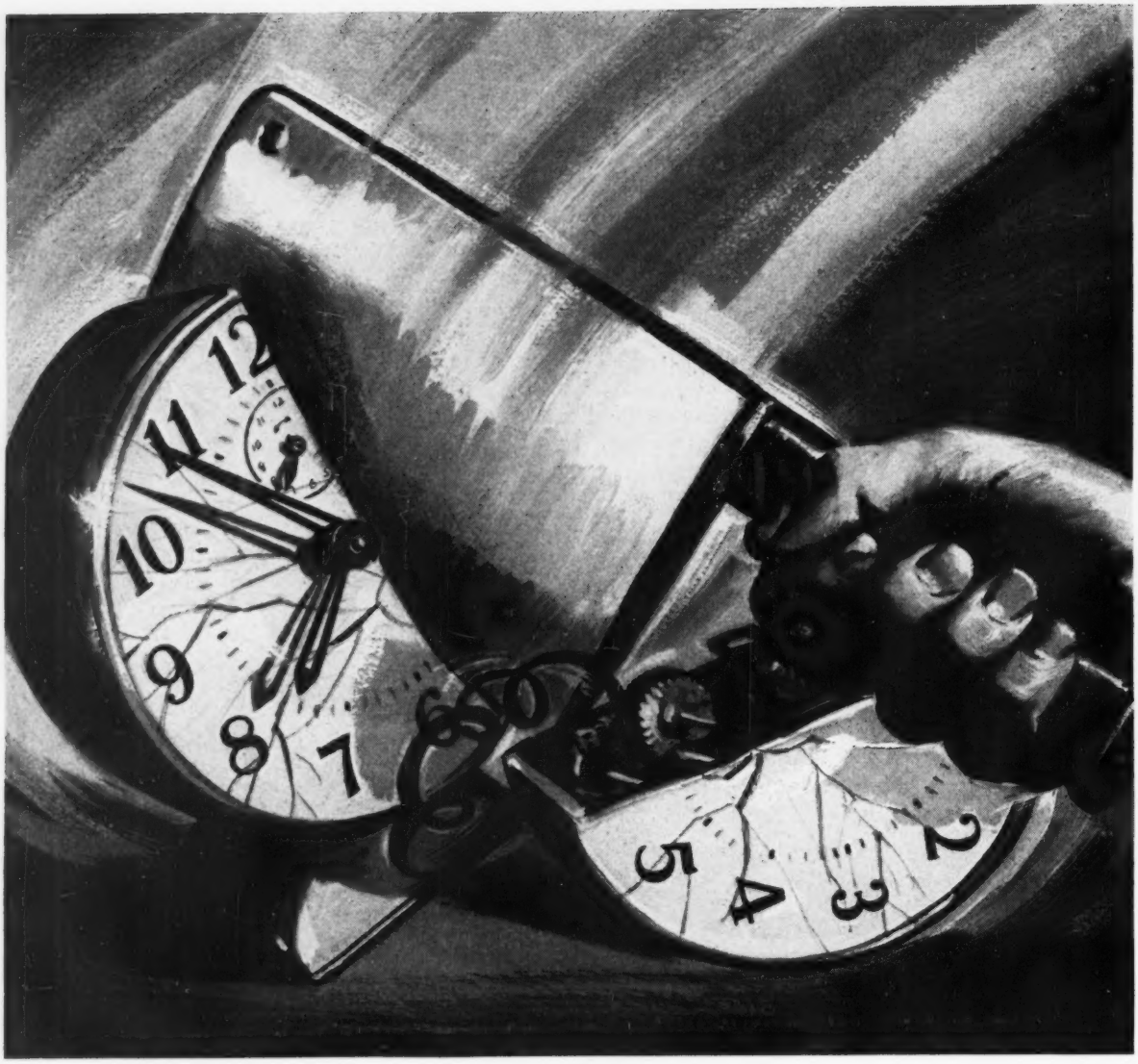
Name_____

Firm_____

Address_____

City_____ Zone_____ State_____

Use coupon on page 227.



Time stands still inside your package . . .

Does every tick of the clock rob your product of a fractional share of its original goodness?

If your product is painstakingly perfect the day you pack and ship it, will oxidation, moisture or light steal some of that goodness before it reaches the consumer?

Such loss need not occur . . . not in this age of scientific packaging. Today's packaging engineer has dozens of flexible materials to choose from. Each has its own unique protective characteristics. By combining several layers of these materials into a single sheet, Acmeflex allows you to handpick the protective qualities you need.

Acmeflex is available in an almost unlimited range of combinations . . . transparent films, metallic foils, plastic-coated papers, combinations of all three! You specify the protective and visual goals of your packaging, we do the rest. Acmeflex can be printed to your specifications and is delivered on webs for high speed packaging equipment.

ACMEFLEX
SAMPLE BOOK

SEND FOR THE ACMEFLEX CATALOGUE today. It contains samples of typical Acmeflex combinations together with their protective specifications.

ACME BACKING CORPORATION
Meadow and Bogart Streets, Brooklyn 6, N. Y.

ACMEFLEX

The barrier packaging that defies the elements.

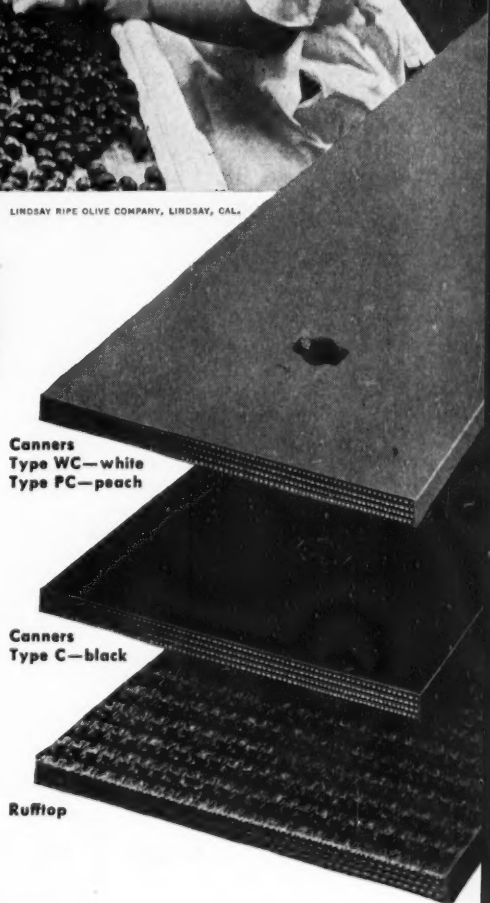
Use coupon on page 227.

LINDSAY RIPE OLIVE COMPANY, LINDSAY, CAL.

Thermoid Conveyor Belting cuts handling costs on food processing jobs

There's a Thermoid Conveyor Belt designed to lower your costs of handling any food product. Here are 3 examples: *CANNERS (WC & PC)*—For handling vegetables, fruit and other foods. Resists acids. Imparts no taste or odor. Available in white or peach color covers. *CANNERS C*—Ideal for use where food is not in direct contact with belt. For packages, waste and refuse. *RUFFTOP*—Thousands of irregular gripper points guide smooth surfaced articles up inclines to 35°.

Thermoid's exclusive impregnation process welds carcass and cover into an exceptionally strong, durable belt. Finest quality reinforcement and specially compounded rubber stocks assure long life, less down time, lower handling costs. Your Thermoid Distributor can help you select the Conveyor Belt best suited for your requirements. If you prefer, write direct for Catalog 3679.



Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

OPEN THE DOOR...

to more frozen food sales with HURON MSG!

● Things happen when you add Huron MSG to foods before freezing—things important to you as a food processor and attractive to frozen food buyers.

Naturally, you can expect enhanced pure food flavors from Huron MSG, America's original monosodium glutamate made from wheat protein. But you also get unexpected bonuses: retention of original taste and quality levels far beyond usual storage periods, and improved color and texture. Such as:

FISH . . . salmon, shrimp, mackerel, haddock and rose fish gain in flavor and all-around palatability. In many cases their original color remains true throughout storage.

MEAT . . . beef, pork sausage, bacon and ham acquire heightened flavor, retain their prefreezing quality longer.

POULTRY . . . all fowl have improved flavor and added juiciness, as well as lengthened storage life.

VEGETABLES . . . most vegetables are given a new full sweetness of flavor. Green vegetables retain color throughout storage and in cooking.

Our Technical Service Department will be glad to furnish you with the cold facts about the best way of using Huron MSG to make your frozen foods taste better, last longer in storage—*and sell faster.* Write or phone—no obligation, of course.

Huron **MSG**

Pure Monosodium Glutamate 99+%

Made by the American pioneers in protein derivatives

THE HURON MILLING COMPANY · 9 PARK PLACE, N. Y. C. 7

FACTORIES: Harbor Beach, Michigan

SALES OFFICES: 161 E. Grand Avenue, Chicago 11 • 13 E. Eighth Street, Cincinnati 2 • 383 Brannan Street, San Francisco 7

HAVE YOU SEEN THIS NEW WEAR·EVER ALUMINUM Tote Box?

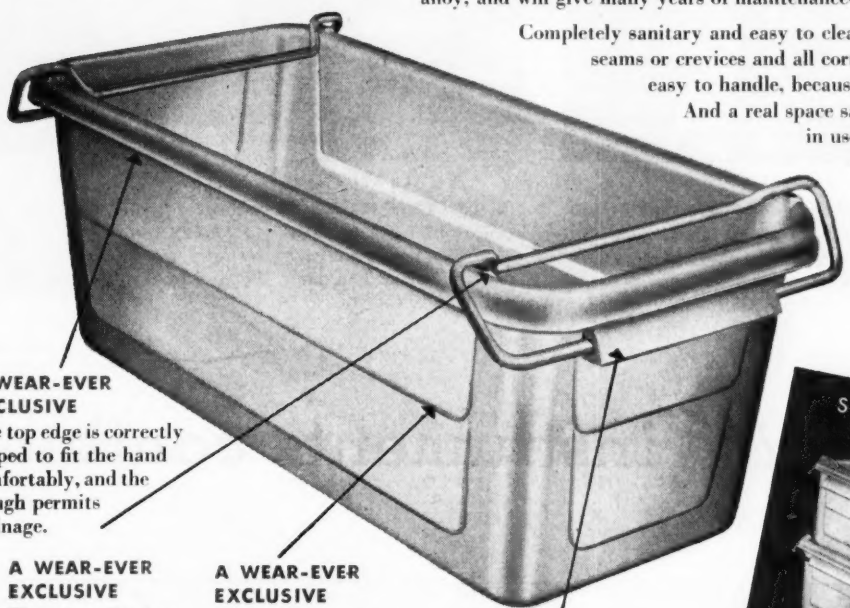
No other food transport container gives you all these features:

This is the only transport box of its depth (12 inches) that is drawn seamless from a single sheet of metal. Yet it is made of extra tough, heavy-gauge aluminum alloy, and will give many years of maintenance-free service.

Completely sanitary and easy to clean because there are no cracks, seams or crevices and all corners are rounded. Light to lift, easy to handle, because it's made of *aluminum* alloy. And a real space saver because it not only stacks in use, but nests when empty. Mail coupon today for a Wear-Ever representative to call and show you this amazing new tote box.

Inside top measures
13½" x 32"

Inside bottom measures
11" x 29½"



A WEAR-EVER EXCLUSIVE
The top edge is correctly shaped to fit the hand comfortably, and the trough permits drainage.

A WEAR-EVER EXCLUSIVE
Wearing Strips brazed on top rim where handles rest.

A WEAR-EVER EXCLUSIVE
For extra strength, double embossing on sides and ends, triple debossing on the bottom.

A WEAR-EVER EXCLUSIVE
One long handle bracket (instead of two). Greater strength, is easier to clean.

WEAR·EVER Aluminum

Standard of Quality for more than 50 years

WEAR-EVER ALUMINUM TRADE MARK REG. U.S. PAT. OFF.

The Aluminum Cooking Utensil Company, Inc.,
309 Wear-Ever Bldg., New Kensington, Pa.

Please have a representative call and show us your new tote box with its exclusive features.

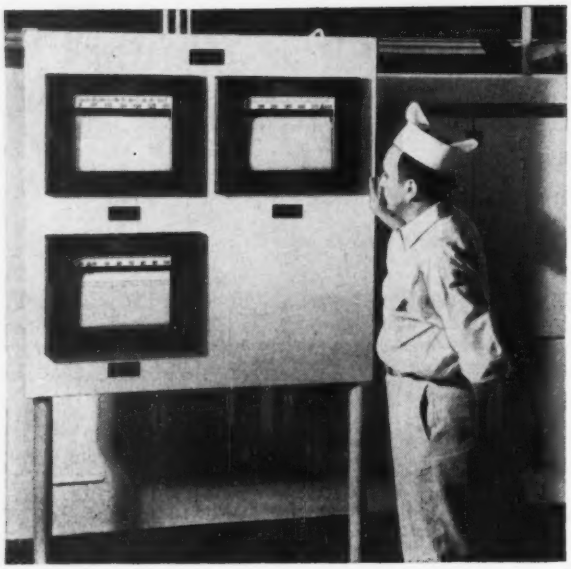
NAME .....

TITLE .....

Fill in, clip to your letterhead and mail.

Use coupon on page 227.

MEAT SPECIAL



IN BAKERIES, *ElectroniK temperature controllers regulate ovens to split-degree precision . . . speed recorders check baking time in continuous ovens. Mixture consistency recorders in many bakeries also take the guesswork out of dough mixing. Photo courtesy of Burny Bros. Bakery, Chicago.*

IN ICE CREAM PLANTS, *ElectroniK instrument located in a quality control laboratory, saves many man-hours of labor by recording temperatures in scattered freezing rooms, mixing tanks, hardening tunnels. Photo courtesy of Goldenrod Ice Cream Co., Chicago.*

ElectroniK instruments continue

Progress in instrumentation...through electronics

Before 1940, most instruments measured by mechanical means. Many of them still do. Look inside the thermometers, flow meters and pressure gauges around your plant, and you'll see mechanical levers, springs and spirals.

To get more accurate ways of measurement, industrial instrumentation borrowed from the scientific laboratory a delicate device called the galvanometer. To simulate the scientist's actions of watching a needle and turning dials, mechanical instruments were developed . . . and they were full of mechanisms as complex and fragile as the works of a watch.

Then along came something entirely new . . . the *ElectroniK* instrument. For the first time, it applied the science of electronics in a practical way to the science of measurement. It used tubes similar to those in your home radio to do the work that formerly required intricate mechanical devices. Because it was much more sensitive, it made possible greater precision than ever before. And because it measured *continuously* and quickly, it told people things about their process operation that they had never known. This higher standard of performance in measurement soon opened the way to advanced types of automatic control.

Best of all, electronics increased the dependability of precise industrial instrumentation. Far from being complex, *ElectroniK* instruments are extremely simple in design and construction. By the thousands, they have proved their ability to stay on the job with an absolute minimum of routine attention.

IN HATCHERIES, *yield and health of poultry are improved by closer control of temperature and humidity.* ***ElectroniK*** *instruments on this central control panel check temperatures of twenty incubators at Trask Turkey Farms, Black River Falls, Wisconsin.*

to make news *in food processing*

RIGHT in the forefront of the food industry's growing trend toward automation, you'll find *ElectroniK* instruments helping to make possible new, advanced techniques in processing. The precision, versatility and speed which these instruments afford have implemented such innovations as aseptic canning, continuous neutralization of cream, concentration and freezing of citrus juices, and many others.

ElectroniK instruments are constantly helping pave the way for the realization of new ideas . . . some of which are pictured here. *ElectroniK* instruments can measure just about anything. Temperature, pH, flow, weight and consistency are but a few of the variables for which they are adapted. And in the field of control, an increasingly important facet of food processing, these instruments can provide any type of regulation, from simple on-off to highly refined proportional action.

As important plus values, they save labor . . . by concentrating a large number of records on a single chart, where supervisors can watch process operation without touring the complete plant. They improve quality . . . by controlling conditions with the hair-splitting precision essential to the success of modern processes. They reduce maintenance costs . . . by eliminating the possibilty of the breakage of capillary tubing, and by their ability to keep on the job with practically no attention.

Your nearby Honeywell sales engineer will be glad to discuss how these instruments can be utilized in your own food production. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

● **REFERENCE DATA: Write for Catalog 1521, "*ElectroniK* Recorders", and for Data Sheets on specific food processing applications.**

MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

First in Controls

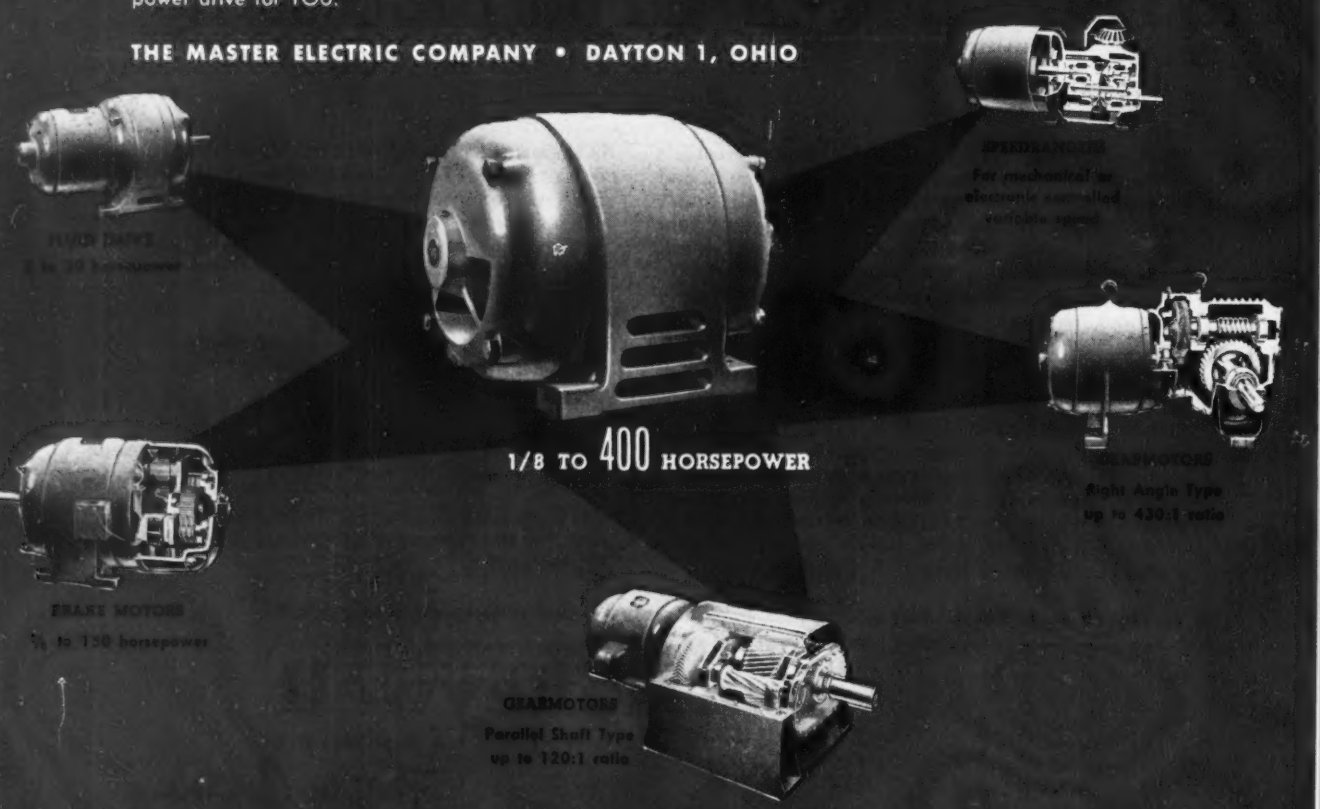
Whenever you select a power unit, don't put a straight-jacket on your ideas . . . consider ALL of the possibilities of modern power drives.

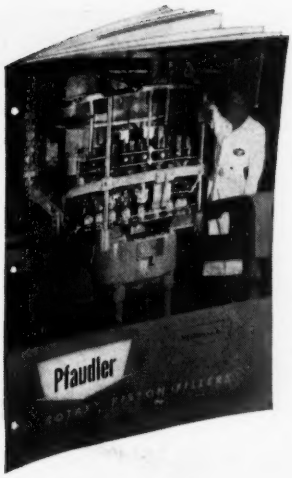
For example consider the many useful combinations that can be secured with the basic Master power units shown below. They're designed so they can be easily combined together to give you the RIGHT horsepower, the RIGHT shaft speed, the RIGHT features in one compact unit that you can use RIGHT where you want it. Nowhere else will you find power units that are so flexible, so easily adaptable, and in such a wide range of types and ratings.

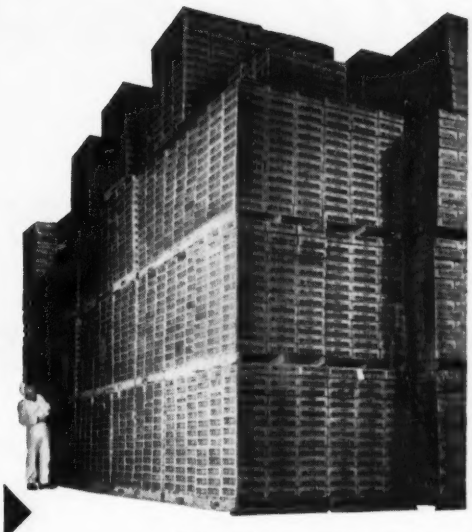
Master power drives are available in thousands and thousands of ratings (⅛ to 400 HP) . . . in open, enclosed, splash proof, fan cooled, explosion proof . . . horizontal or vertical . . . for all phases, voltages and frequencies . . . in single speed, multi-speed and variable speed types . . . with or without flanges or other special features . . . with 5 types of gear reduction up to 430 to 1 ratio . . . with electric brakes . . . with fluid-drive . . . with mechanical or electronic variable speed units . . . and for every type of mounting . . . Master has them all and so can be completely impartial in helping you select the one best power drive for YOU.

give your brains a chance

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO







This tower of cases represents a typical eight-hour day's output—242,000 jars of baby food—on a Pfaudler RP-21 Piston Filler at Beech Nut Packing Co.

This new booklet

. . . can show you how to do this

. . . and answer these questions:

Exactly how does a rotary piston filler operate?

- Diagrams and explanation show you how!

How can I lower the cost of cleaning food fillers?

- Booklet shows you how 1 man, using no tools, can do the job in less than ½ hour!

Can you guarantee the speed of filling my products?

- Typical chart gives examples of guaranteed filling speeds!

What fillers are available, and what jobs are they designed for?

- Six well-organized pages on filler operation and accessories give you all the answers!

if *you mail this coupon . . . today!*

Pfaudler

THE PFAUDLER CO., ROCHESTER 3, NEW YORK

Engineers and Fabricators of Food Processing Equipment

Gravity Fillers	**Steam Peelers**	**Vacuum Pans**
Piston Fillers	**Deaerators**	**Evaporators**

THE PFAUDLER CO., Dept. FE-9, Rochester 3, N.Y.

Please rush me a copy of your new rotary piston filler booklet No. 911.

☐ I am working on a problem in filling.

☐ I want to bring my literature library up to date.

Name_____

Title_____

Company_____

Address_____

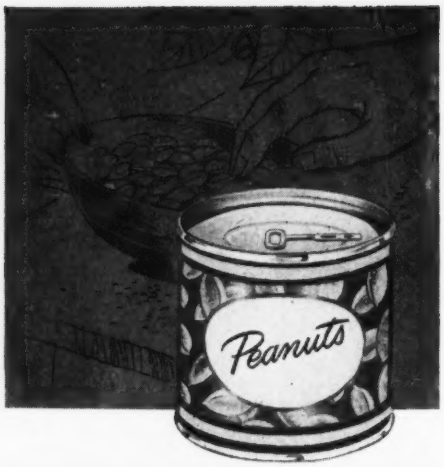
City_____ Zone____ State_____

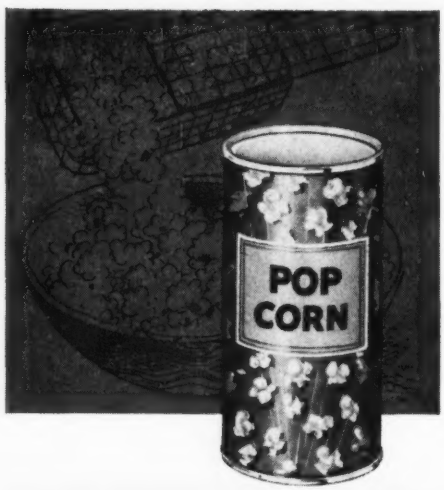
Use coupon on page 227.

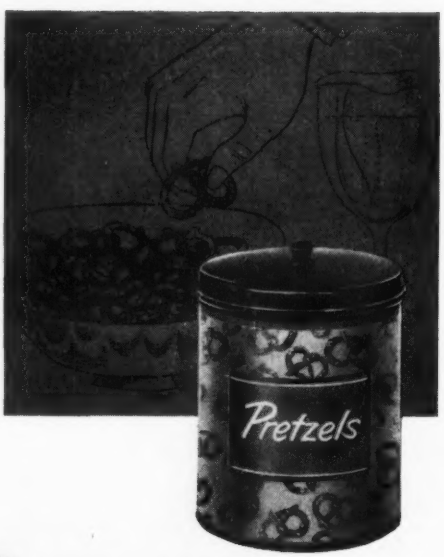
MEAT SPECIAL

Of course...

Continental has tailor-made package service for your "snack" items







Continental packages almost everything

When you bring your packaging problems to Continental, you put your products in good hands. You can depend on us to supply you with beautifully lithographed containers with the "come hither" look it takes to swing impulse sales. But this is only the beginning. We'll offer you expert engineering and research help, in just the quantity you want. We'll schedule deliveries to suit you exactly. In short, we'll treat you as if you were our only customer. Why not see what our tailor-made package service can mean to you?

Is your product listed here?

Let us show you containers designed for:

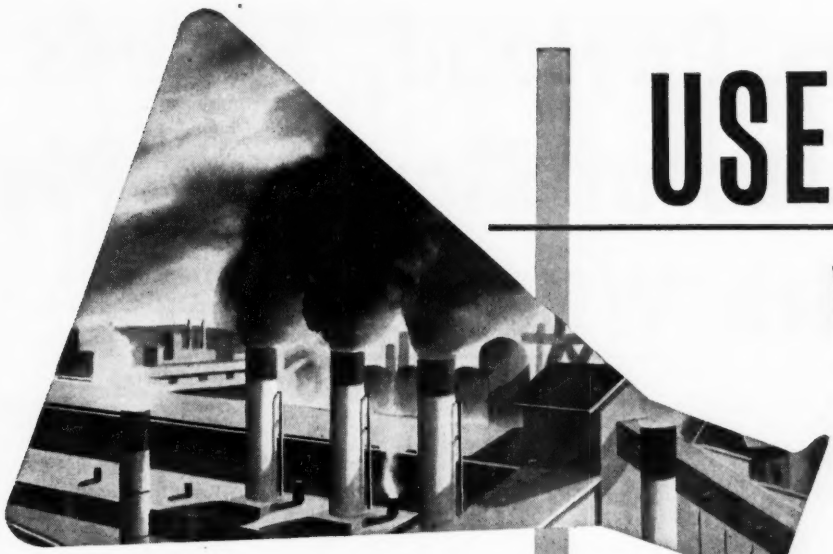
brown bread	glazed fruit	plum pudding
candy	ice cream mixes	popcorn
date bread	nut bread	potato chips
fountain syrups	nutmeats	pretzels
fried noodles	nut butters	shoestring potatoes
fruit cake	peanuts	table syrup

and many other food specialties

CONTINENTAL CAN COMPANY

CONTINENTAL CAN BUILDING, 100 EAST 42nd STREET, NEW YORK 17, N. Y.

Eastern Division: 100 E. 42nd Street, New York 17
Central Division: 135 So. La Salle Street, Chicago 3
Pacific Division: Russ Building, San Francisco 4

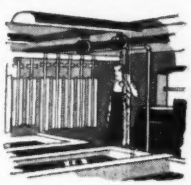


USE WASTE HEAT!

AIR CONDITIONING

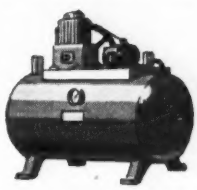
Let the adaptable Servel 25-ton Water Chiller convert waste heat, or steam from any source, into lowest cost air conditioning for your plant and offices!

PROCESS COOLING

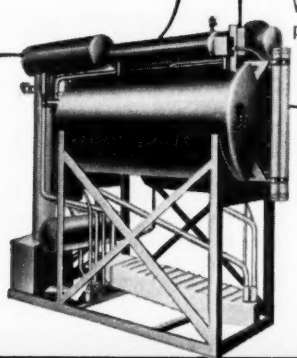


Use the cheapest energy source —even waste heat—to achieve high-efficiency cooling for manufacturing processes! Servel Water Chiller operates on dependable absorption principle.

INDUSTRIAL PRECOOLING



Increase capacity and improve performance of air compressors and internal combustion machines! The Water Chiller is compact, light; can be safely installed on almost any floor.



The Servel Water Chiller cooling system has no moving parts to wear. It is quiet and vibration-free. Light floor loading and freedom from vibration mean that no special foundations or braces are needed. Zone control is unusually easy. And operation (using waste heat, or steam from the cheapest source) is low in cost. Backed by a 5-year warranty. See your dealer or mail coupon for information and engineering co-operation.

Servel

the name to watch for great advances in

AIR CONDITIONING ✓ REFRIGERATION

SERVEL, INC., Dept. FE-94, Evansville 20, Indiana

Please send me complete information on Servel equipment for ☐ Air Conditioning, ☐ Process Cooling, ☐ Industrial Precooling.

Name_____

Firm_____

Address_____

City_____ County_____ State_____

Use coupon on page 227.

Boosts Payload, Speeds Deliveries of Morton's Pies With WHITE 3000

...Morton Packing Company
Louisville, Ky.

ADEQUATE STOCKS . . . ahead of schedule.
RETURN HAUL . . . savings on frozen ingredients.

These are the double advantages Morton Packing Co., Louisville, found from the White 3000 fleet they now have in service.

These Whites are engineered to Morton's exact operating conditions and weight limits . . . permit maximum payloads and low operating cost.

Find out how White Specialized Design has special advantage in your service. You are losing money by the truckload until you see *your* White Representative.

Facts about this WHITE for "REEFER" TRANSPORT

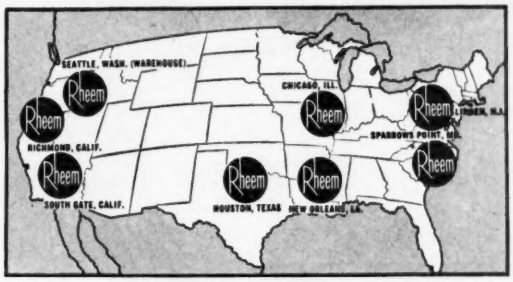
- White Model 3022PLT has 109½ inch wheelbase, Mustang 250A Engine, 507BH Transmission, 5th direct, 329-C rear axle with 5.57/7.60 ratio.
- Pulls 35 ft. refrigerated trailer with all-aluminum construction, 6 inch insulation. Complete unit is under 45-feet.
- Axle weights conform to 50,000 lb. law with payload of 27,000 pounds.
- Operates 100,000 miles per year through Virginia and Eastern Seaboard.

THE WHITE MOTOR COMPANY
Cleveland 1, Ohio

FOR MORE THAN 50 YEARS THE GREATEST NAME IN TRUCKS

GET BOTH STEEL AND FIBRE DRUMS QUICKLY-FROM ONE SOURCE-RHEEM

RHEEM STEEL CONTAINERS ARE MADE IN SEVEN STRATEGIC LOCATIONS



Rheem Fibre Drums are being manufactured in four of these plants. Production lines are scheduled for installation in other plants soon.

"FAMILY IDENTIFICATION"

Rheem can furnish on Fibre drums the same type of decorative service it provides users of Rheemcote lithographed steel drums. Any design or trade-mark can be reproduced on an all-over label for Fibre drums in any number of colors to provide "family" identification for your products.

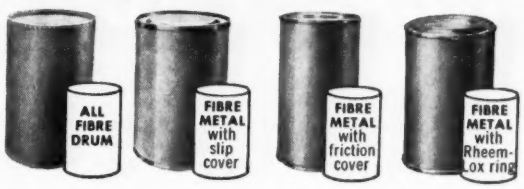
55-gal. Rheemcote Steel Drum

30-gal. Rheem Fibre-Metal Drum

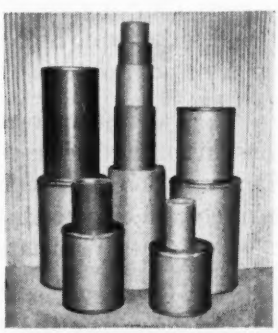
RHEEM ANNOUNCES A COMPLETE LINE OF FIBRE DRUMS TO SUPPLEMENT ITS STEEL SHIPPING AND EQUIPMENT CONTAINER LINES

To supplement its line of steel shipping and custom equipment containers, Rheem has added a complete line of Fibre and Fibre-Metal drums. These strong, lightweight, low-cost drums come in four types and in a wide range of sizes.

Choose the Drum that Fits Your Needs



Choose the type that best fits your needs—All-Fibre drums, or Fibre-Metal drums with either slip or friction covers or with the new, easy to install and remove Rheem-Lox ring. Only Rheem offers all these types of low-cost containers.



Choose the Size that Fits Your Needs

Choose the size that best fits your needs. Fibre drums from 1 to 32 gallons in capacity; Fibre-Metal drums from 5 to 60 gallons. There is virtually a size for every possible requirement.

MAIL COUPON IN NOW! *for complete information*

RHEEM
MANUFACTURING COMPANY

Chicago 29, Illinois • New Orleans 20, Louisiana • Seattle, Washington
Houston 20, Texas • New York 22, New York • South Gate, California
Linden, New Jersey • Richmond 4, Calif. • Sparrows Point 19, Maryland
Export Sales, New York 22, New York

Foreign Affiliates and Associates:
Argentina - Buenos Aires • Australia - Adelaide, Brisbane, Fremantle, Melbourne and Sydney • Brazil - Rio de Janeiro • Canada - Hamilton • Italy - Milan • Peru - Lima • Philippine Islands - Manila • Singapore • Spain - Madrid • United Kingdom - Bristol

NOW, MORE THAN EVER BEFORE, YOU CAN RELY ON RHEEM FOR ALL YOUR SHIPPING CONTAINER REQUIREMENTS

RHEEM MANUFACTURING COMPANY
(Mail to Nearest Sales Office, Listed at Left)

☐ We would like to have your packaging engineers come to our plant and study our shipping container problems.

☐ Please send additional information.

NAME OF COMPANY _____

STREET _____

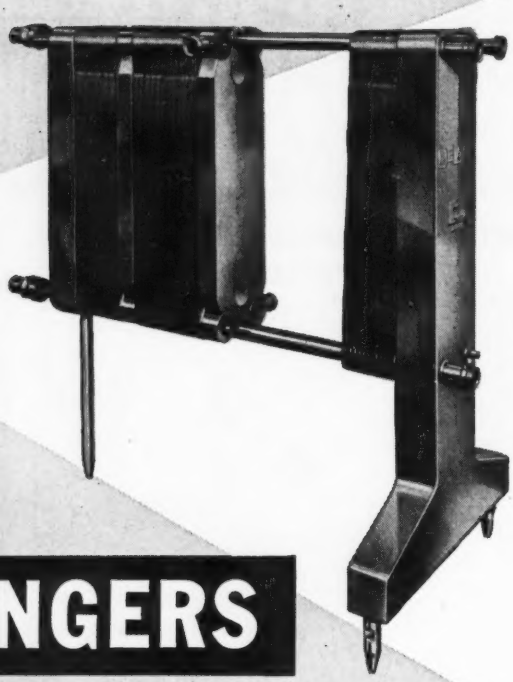
CITY _____ ZONE ____ STATE _____

BY _____ FE-9

Use coupon on page 227.

MEAT SPECIAL

LOOK TO DE LAVAL FOR HEAT EXCHANGERS ...as Well as Centrifugals



De Laval Plate Heat Exchangers are designed with the engineering "know-how" and manufactured to the same high standards of precision as De Laval Centrifugals, and offer these advantages:

Unsurpassed heat transmission
All heat-transmitting surfaces readily accessible for inspection and cleaning
Easy variation of assembly to meet changes in operation
Ease of assembly and disassembly—special design for precision tightening
Withstand high pressures

De Laval Bulletin PHX shows exactly how De Laval Plate Heat Exchangers are constructed and describes the De Laval Vacuum-Steam Heating System for closest possible temperature control. *Write for it.*

THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York • 427 Randolph St., Chicago 6 • DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5

DE LAVAL
PLATE HEAT EXCHANGERS

To Market, To Market...

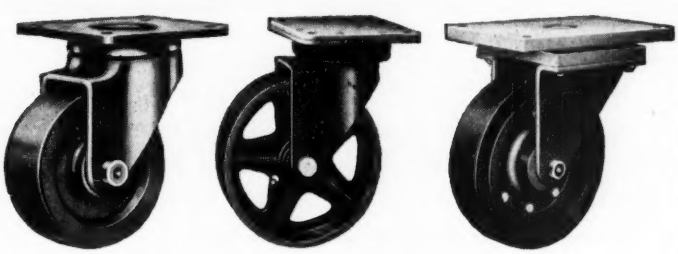
in jig time

with Colson® materials-handling equipment

Through processing, in and out of storage, on and off freight cars and trucks—for every move you make there's a COLSON materials-handling product to help you speed the flow of goods.

There are over 1500 models of famous COLSON Casters—many of them designed to meet the special needs of food processing and packaging plants. COLSON also manufactures such cost-cutting materials-handling equipment as Box Trucks, Drum Trucks, Platform Trucks, Hand Trucks and Lift-Jack Systems, such as shown above.

COLSON
UNIVERSAL DRUM
TRUCK



Write us or check the yellow pages of your phone book (under "Casters" or "Trucks, Industrial") for the COLSON office near you.

THE COLSON CORPORATION
ELYRIA, OHIO

CASTERS . . . . LIFT-JACK SYSTEMS . . . . INDUSTRIAL TRUCKS

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THE COLSON CORPORATION
ELYRIA, OHIO

Please send free catalog on "Colson Trucks and Casters"

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CITY.....

ZONE..... STATE.....

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GET *More* FOR YOUR

ANTIOXIDANT DOLLAR!

GET ALL 4 VITAL INGREDIENTS

"BHA" and "BHT"... *For Greater Carry-Through Stability!*
Together, they deliver more stability through the baking process than an equal volume of either one, alone.

PROPYL GALLATE... *For Maximum Storage-and-Shelf-Life!*
And this potent stabilizer has an affinity for the "carry-through" ingredients.

LECITHIN-CITRATE... *For Insurance against Metal Contamination!*
Only from Griffith can you secure the color protection of this oil-soluble ingredient. It sequesters trace metals. (*Pat. No. 2,677,616*)

GET NEW "G-15" ANTIOXIDANT

Formulated and Sold by Griffith Exclusively

"G-15" is the only antioxidant that contains all *four* vital ingredients. It's entirely oil-soluble . . . mixes easily and thoroughly in the fat. Doesn't alter taste or color. Is safely stored and shipped in ordinary, no-deposit steel drums.

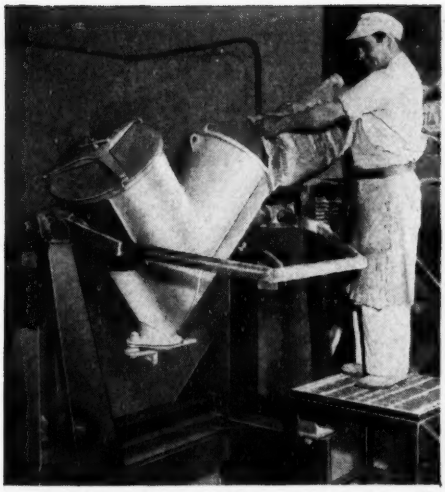
Get MORE for your money. Start today by getting the facts about the performance and cost of "G-15"—from our representative, or by return mail.

THE *Griffith* LABORATORIES, INC.

In Canada—The Griffith Laboratories, Ltd.

CHICAGO 9, 1415 W. 37th St., NEWARK 5, 37 Empire St., LOS ANGELES 58, 4900 Gifford Ave., TORONTO 2, 115 George St.

Laboratorios Griffith do Brasil, S. A.—Caixa Postal 300 Mogi das Cruzes, Sao Paulo, Brasil



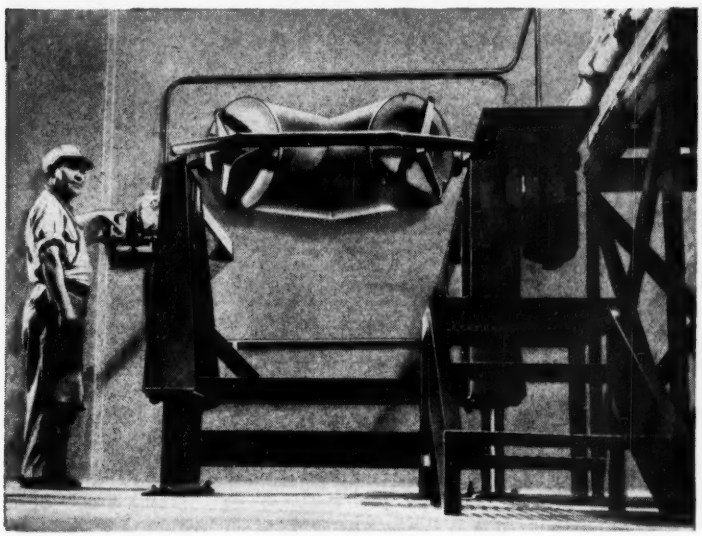
UNITED PRESS

Production worker Cruz Flores starts filling p-k twin shell blender with limestone flour. Pencillin drugs are also added, *then*...

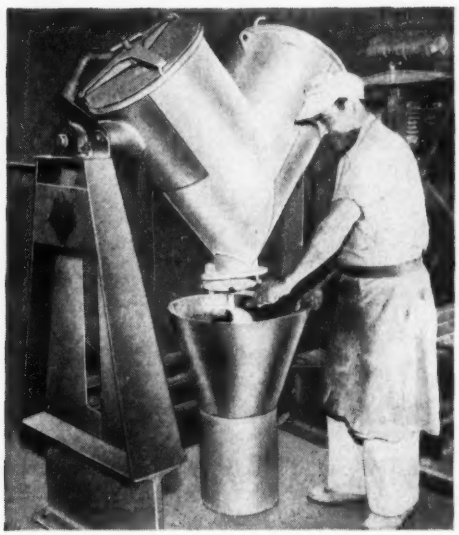
At the Los Angeles plant of Pillsbury Mills, Inc. . . .

p-k "pays the freight"

p-k Twin Shell Blender* mixes dry feed locally— cuts freight costs, ends delays.



After pushing starting button, Flores is free for other work until mixing is completed. Power consumption is low because of p-k's unique patented design. *Finally*...



Dust-tight slide valve is opened, thoroughly blended feed flows out freely from p-k's smooth, obstructionless interior.

When your blender gives a thorough mix, does it fast, and is easy to operate and maintain—then it's a cinch to "roll your own." In fact, sometimes it's even better! That's the conclusion of Pillsbury Mills, Inc., Los Angeles plant, and they know by experience.

Mixtures of anti-biotic-treated feeds were previously shipped west from the main plant in Iowa. "If there was a critical hold-up in deliveries," says Los Angeles plant superintendent Charles F. Wilson, "we faced a stalemate in operations. Moreover, there were freight costs. Now, with our p-k blender, all that is changed."

"The time and labor required to operate it is negligible," in Mr. Wilson's words, and both discharging and cleaning are equally easy. Absence of interior obstructions means free material flow, and "... we just haven't had any maintenance problems."

p-k twin shell dry blenders are continually making records in dozens of other fields—for speed, ease of operation, uniformity of blend. Send us a sample of your materials for a thorough blending analysis—or write today for fully illustrated Catalog 12.

*Patented

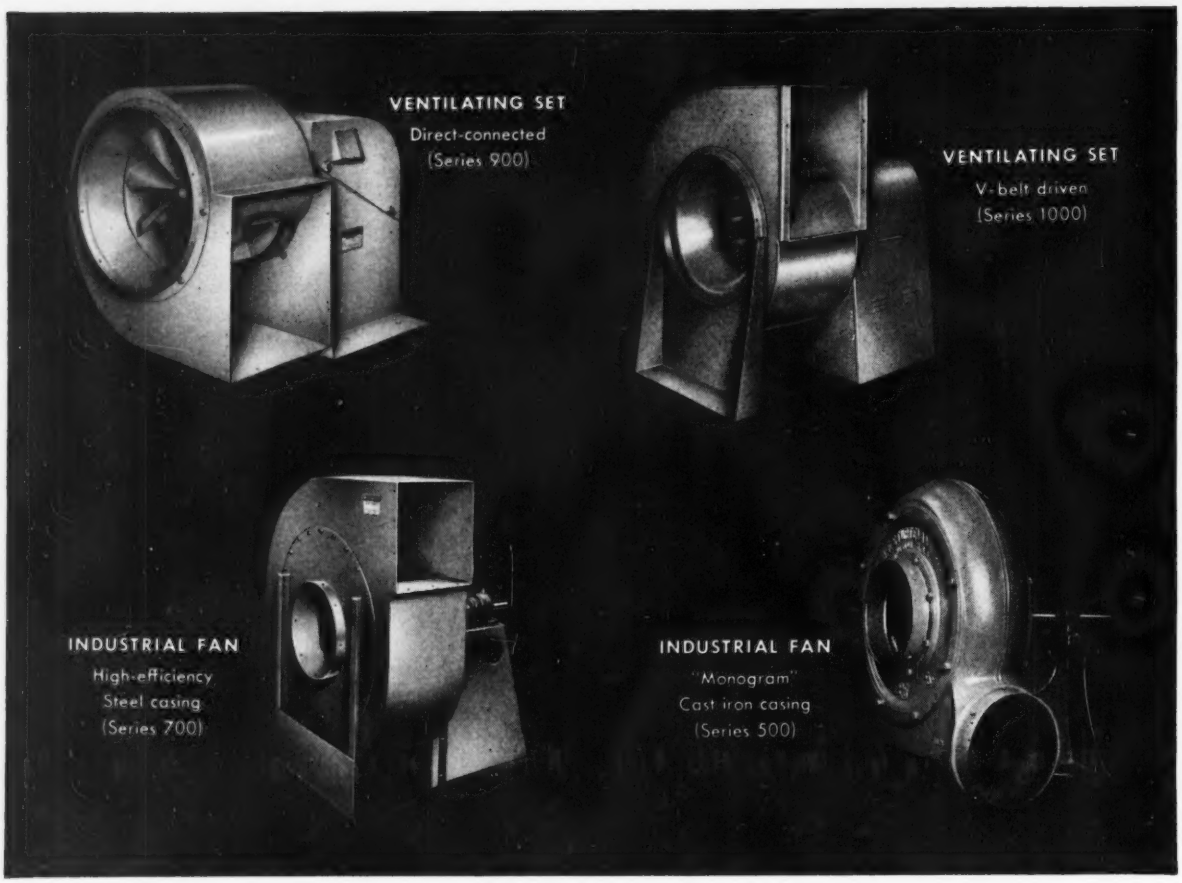
the **Patterson-Kelley Co., inc.**

1590 Lackawanna Avenue, East Stroudsburg, Penna.

2545

101 Park Avenue, New York 17 • Railway Exchange Building, Chicago 4 • 1700 Walnut Street, Philadelphia 3 • 96-A Huntington Avenue, Boston 16 • and other principal cities.

Use coupon on page 227.



These Westinghouse Fans Help You Increase Production . . . Employee Efficiency

Whatever your air handling problem . . . smoke, fumes, vapor, dust, wood shavings, granular material or ventilating . . . these Westinghouse fans are designed to handle or remove them . . . efficiently and economically.

INDUSTRIAL FANS (SERIES 700) . . . for dust collecting and conveying at high pressure. Wide range of capacities. Three types of wheels in 11 sizes.

1. Air Handling Wheel . . . particularly adaptable for general air handling and exhaust systems in removal of smoke, fumes and gases.

2. Material Handling Wheel . . . designed specifically for grinding and buffing wheel systems, and conveying materials such as chips, sawdust and grains.

3. Long Shaving Wheel . . . handles long fibrous materials that pass through the fan itself: trimmings from corrugated boxes, alfalfa, long shavings from woodworking machinery, rags, others.

INDUSTRIAL FANS (SERIES 500—MONOGRAM) . . . ruggedly built, with cast iron casing. For use as a blower or exhaust or for dust control, collecting and conveying waste or raw materials, supplying air for furnace blast, drying, etc. Provides long, trouble-free service at low cost under severest operating conditions. In 10 sizes with wide range of capacity.

SERIES 900 VENTILATING SETS . . . compact, efficient, direct-connected and ready-to-run. Especially suited for small ventilating installations. Cleanable radial blade wheel design minimizes problem of handling airborne dirt and grease. Six sizes from 6" to 15" wheel diameters.

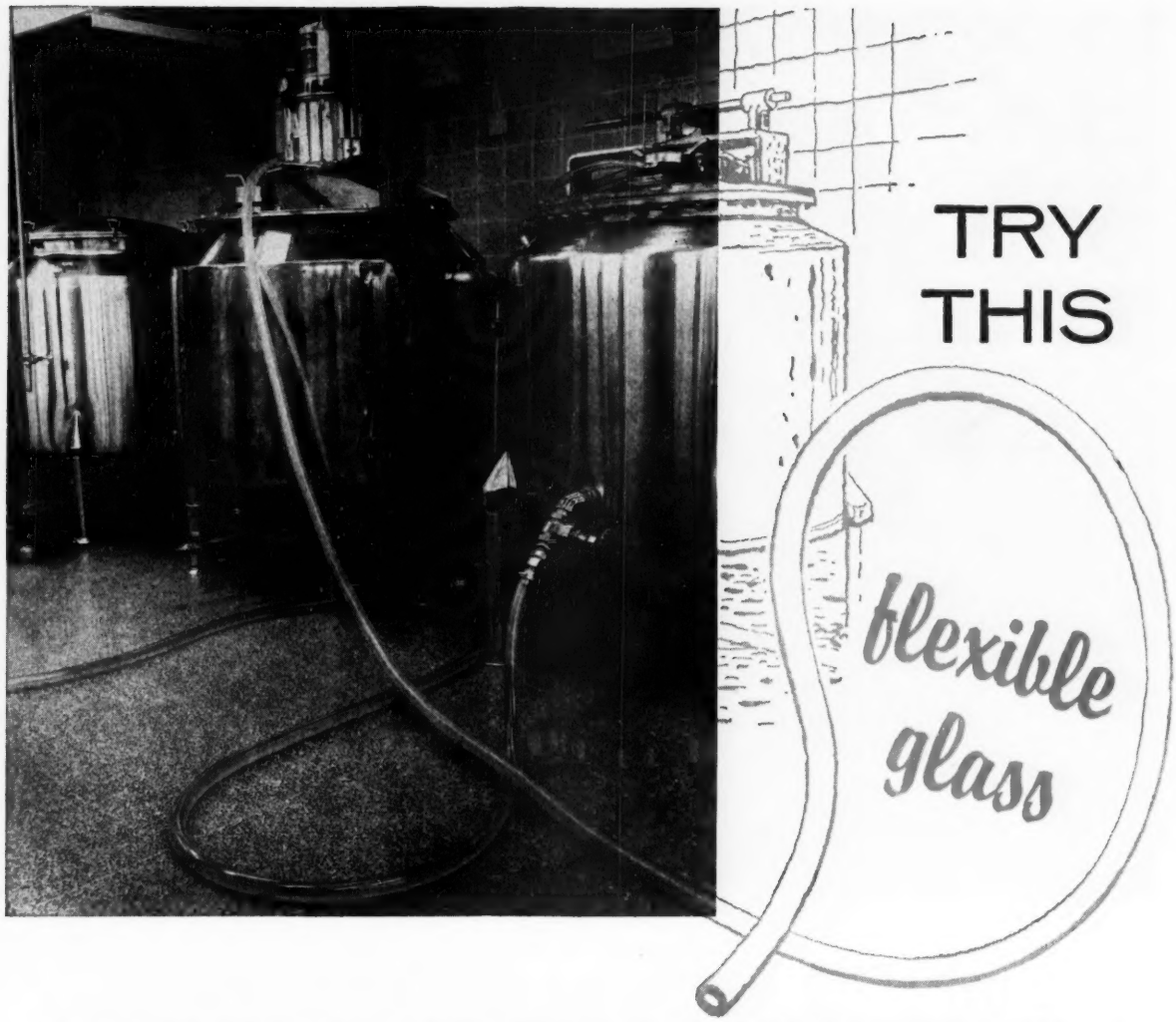
SERIES 1000 VENTILATING SETS . . . V-belt driven, self-contained. Install indoors or outdoors in a wide variety of heating, ventilating or air conditioning applications. Twelve sizes from 9" to 30" wheel diameters.

These rugged, powerful Westinghouse fans provide the most economical solution to your specific air handling problem. And Westinghouse fans offer a *single equipment warranty* with undivided responsibility . . . an *exclusive* Westinghouse-Sturtevant feature. Get the facts today on the fan built for *your* need from your nearest Westinghouse-Sturtevant office. Or write: Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Mass.

WESTINGHOUSE AIR HANDLING

J-80380B

YOU CAN BE SURE...IF IT'S Westinghouse



For Safer FLUID FOOD TRANSMISSION

Tygon flexible plastic tubing well deserves to be called "the flexible glass." It is crystal clear for easy solution visibility. Flexible as a piece of string, it simplifies set-up and dismantling of lines. Tough, abrasion-resistant, and unbreakable, it can take the roughest kind of service. It doesn't chemically deteriorate with age; it cleans easily and thoroughly, can be steam sterilized if desired. It is endorsed and approved by medical authorities and manufacturers of food processing equipment for safe, pure handling of food products.

Yes, Tygon flexible plastic tubing is the clear solution to many fluid handling problems. It's available in bore sizes from 1/16th inch to 2 inches. And for high pressure use (250-300 psi) is available with an outer braid reinforcement of stainless steel.

PRODUCT OF
U.S. STONEWARE
Akron 9, Ohio

Plastics and Synthetics Division

Write for Bulletin T-87 just off the press — 24 pages of technical data describing how and where you can use Tygon Tubing. U. S. Stoneware Co., Akron 9, Ohio, Plastics and Synthetics Division.

419 - D

Use coupon on page 227.

9 out of 10 leading packers are advertising Flex-Vacuum packed luncheon meats

These typical campaigns are Exhibit A in the hottest merchandising trend in luncheon meats.

They have two things in common: top-quality luncheon meats and Flex-Vac packages. Teaming this pair is heads-up meat merchandising.

Here's why: Flex-Vac's vacuum pack insures *maximum flavor, freshness* and *color protection* for luncheon meats. That's how Flex-Vac makes *brand identification* a paying proposition.

Result? Sales of luncheon meats are booming. Shoppers are pre-sold by national advertising, and the improved appearance of Flex-Vac packed meats is paying off at the point of sale.

Check with Flex-Vac now – for the four good reasons below – and cash in on this new trend in consumer preference.

- *Flex-Vac is the only single source* for all three essentials of successful high vacuum packaging – 1) machinery 2) pouches 3) know-how.
- *Flex-Vac Pouches*, the only pouches specifically engineered for high vacuum packaging.
- *Flex-Vac Quality Printing and modern design* step up point-of-sale appeal.
- *Flex-Vac three-man service teams* coordinate all phases of your processing, packaging and merchandising.

V.4.10A

STANDARD PACKAGING CORPORATION

FLEX-VAC DIVISION

FLEXVAC

For the ***LIFE*** of your product – **Flex-Vac . . . *FIRST*** in flexible vacuum packaging

GENERAL SALES OFFICES: 629 Grove Street, Jersey City, N. J, SALES AND SERVICE OFFICES: Atlanta • Chicago • Los Angeles • New York

Gives you MORE POWER...
Gives you MORE VALUE!

Only a Dodge truck offers these exclusive years-ahead features . . . provides so much extra worth for the low price that you pay!

NOW YOU CAN GET

the world's most powerful low-tonnage truck engine . . .

NEW 145-HP. POWER-DOME V-8

for ½- through 1-ton pick-ups, panels, and stakes

☆ Greatest power line-up

Famous Power-Dome V-8's with unique dome-shaped combustion chambers for top power and efficiency! Full line of thrifty time-proved 6's, too! 6 great engines in all—103- to 172-horsepower!

☆ Easiest handling

39° turning angle—for sharpest turning, easiest parking of any truck! Plus new gear-before-axle steering system that helps absorb road shocks, cuts driving fatigue to a minimum!

☆ Most comfortable cab

Widest, roomiest cab interior of them all—with 61¾" of hiproom, 58⅜" of shoulder-room! Deepest easy-chair seat—with 86 soft super-cushion coil springs!

☆ Best Visibility

Biggest windshield in the popular truck field—951 sq. in. in size! Most total vision area, too, with a full 2261 sq. in.! You see more from every angle in a Dodge truck!

☆ Plus biggest savings

Power-Dome V-8 design gets more miles from every gallon of regular gas, stretches your fuel dollars! And Dodge truck quality engineering saves you even more money in long life, low maintenance!

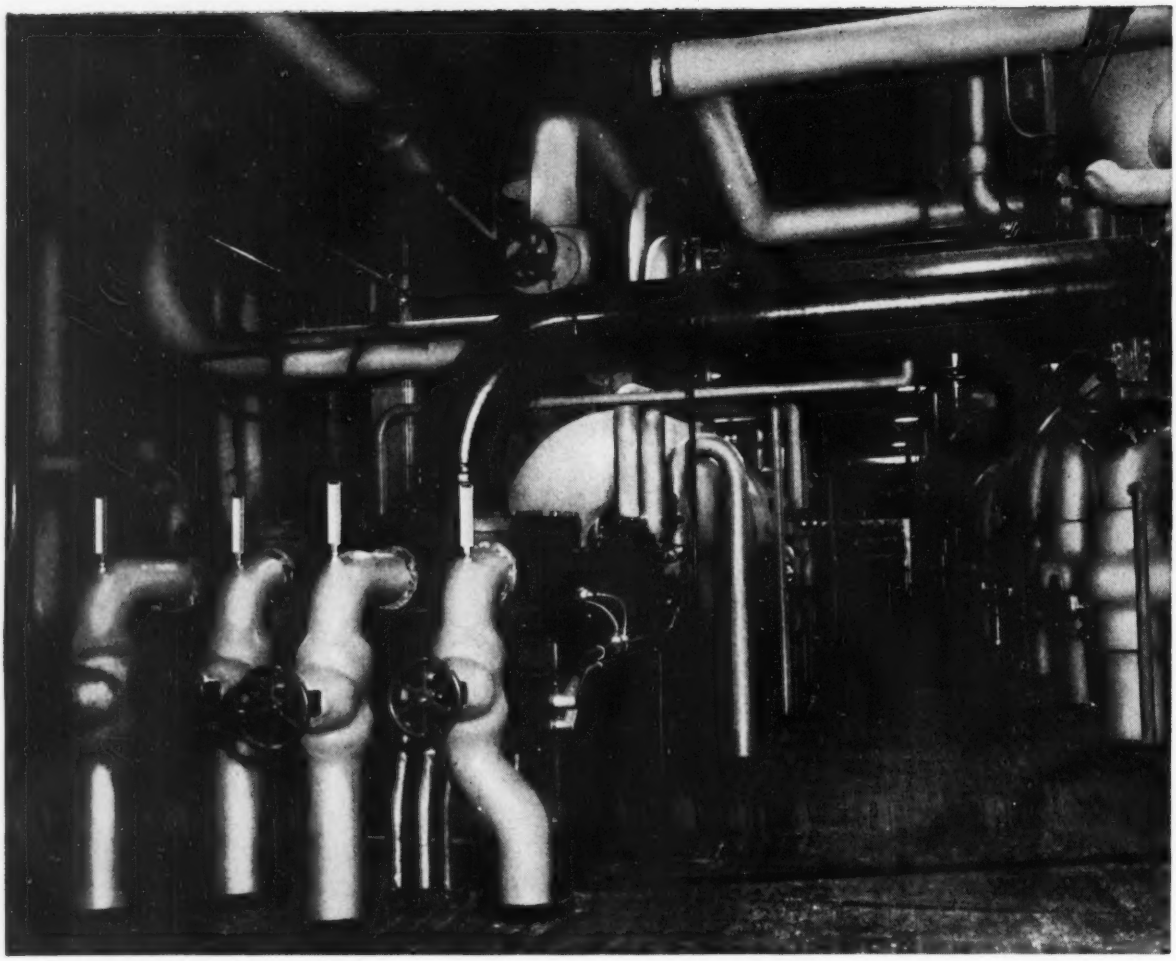
SEE YOUR DEPENDABLE DODGE TRUCK DEALER TODAY!

Added proof...

that there's a better deal for the man at the wheel . . . with new

DODGE "Job-Rated" TRUCKS

Use coupon on page 227.



Main steam line and feeder equipment of a large southern power station insulated with a combination of K&M Hy-Temp and "Featherweight" 85% Magnesia.

Dollar and heat loss minimized by power stations with

K&M HIGH TEMPERATURE INSULATIONS

For efficient, money-saving conservation of heat, keep in mind dependable K&M High Temperature Insulations. For example, by itself, "Featherweight" 85% Magnesia (85% basic carbonate of magnesia and asbestos fiber) effectively insulates piping and equipment with temperatures up to 600° F. Used with a primary layer of K&M Hy-Temp Insulation (diatomaceous silica), the combination is effective on applications up to 1900° F.

These K&M insulations last the life of the equipment they serve. They withstand moisture, vibration and frequent temperature changes.

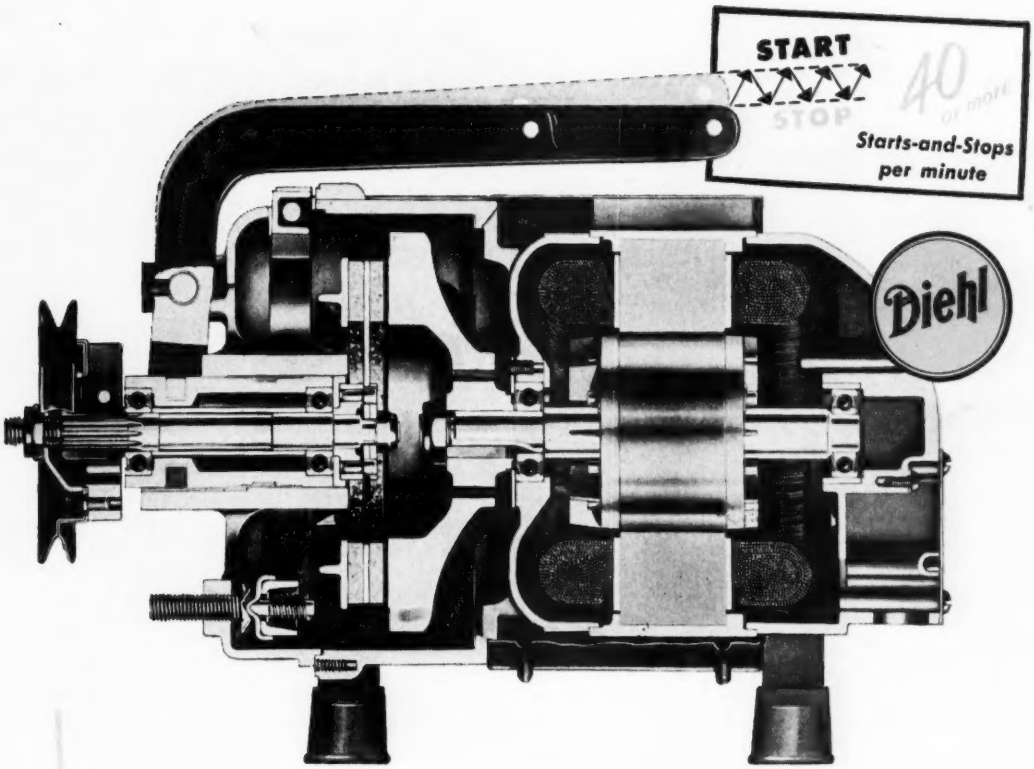
New and now available is "Featherweight" Water-Resistant Magnesia Insulation for temperatures up to 450° F. It is for use where severe water exposure may damage the insulation or on indoor lines and equipment where high humidity and moisture is necessary.

Your K&M distributor is an experienced applicator who will gladly give you more information on these heat-saving, money-saving K&M insulations. Or write directly to us.

KEASBEY & MATTISON COMPANY • AMBLER • PENNSYLVANIA

Nature made asbestos . . . Keasbey & Mattison has made it serve mankind since 1873

K&M best in asbestos ®



DIEHL Type "J" Power Transmitters

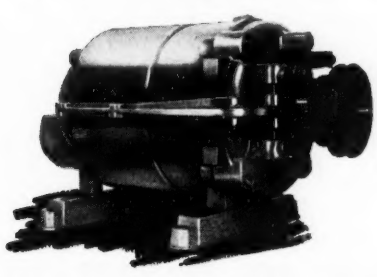
Unequalled for Repeated Start-Stop Machine Operation

V-BELT DRIVE PULLEY • HEAVY DUTY CLUTCH • POWERFUL BRAKE
HIGH INERTIA FLYWHEEL • TOTALLY ENCLOSED MOTOR

Repeated, rapid start-stop machine operation, impractical with conventional motor drives, is now obtainable with Diehl Power Transmitters. Forty or more starts and stops per minute, hour after hour, are commonplace with these drives. Many manufacturers have made substantial increases in machine output by the shortening of acceleration and deceleration waiting periods.

In one compact unit, the Diehl Power Transmitter incorporates a totally-enclosed fan-cooled ball bearing motor; a high inertia, dynamically balanced flywheel; a positive short-throw, lever-actuated clutch brake assembly. The actuation may be controlled mechanically or electrically.

These Power Transmitters are now used extensively on machine tools, textile machinery, winding and spooling equipment, conveyors and many other types of machinery where repeated starting and stopping is required. In countless instances, the use of Diehl Power Transmitters has made it possible to simplify machines, reduce costs, improve operation, save space and eliminate over-motoring solely for acceleration. Many of *your* troublesome machine drive problems may be solved with Diehl Power Transmitters.



Available in sizes from ¼ H. P. to 5 H. P.
900, 1200, 1800 and 3600 R. P. M.

DIEHL MANUFACTURING COMPANY
Electrical Division of THE SINGER MANUFACTURING COMPANY
Finderne Plant, SOMERVILLE, N. J.

Please send me the following bulletins
☐ Type "J" Power Transmitter Bulletin No. FE-3303.
☐ Consolidated Motor Catalog and Price List No. FE-3310

Name_____
Company_____
Street_____
City_____ State_____

OTHER INTEGRAL AND FRACTIONAL HORSEPOWER MOTORS ARE AVAILABLE IN A WIDE RANGE OF TYPES AND SIZES

Use coupon on page 227.

THESE EXCLUSIVE PRECISION-MACHINED GUIDES

eliminate chatter

lengthen service life

IN LUNKENHEIMER

IRON BODY GATE VALVES

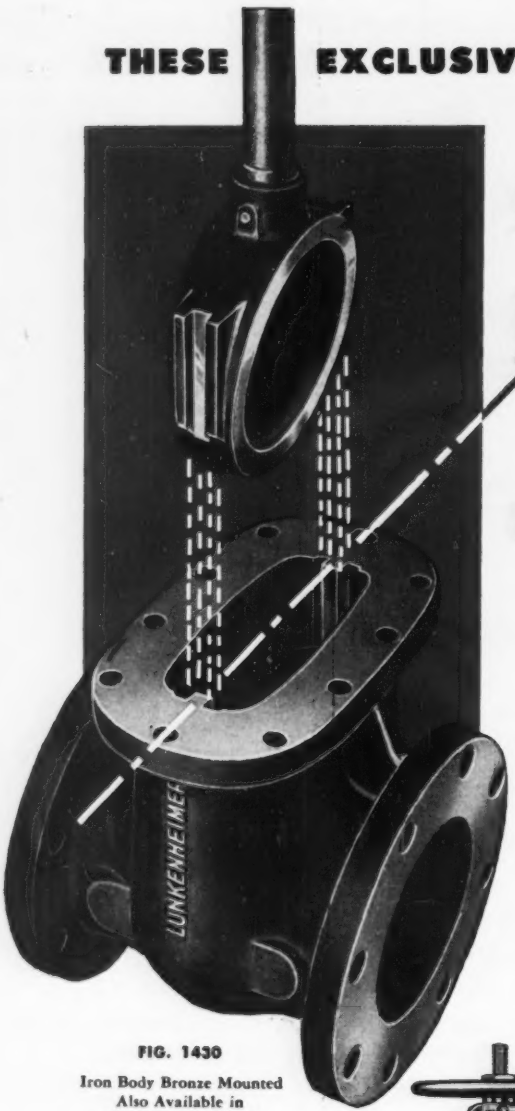
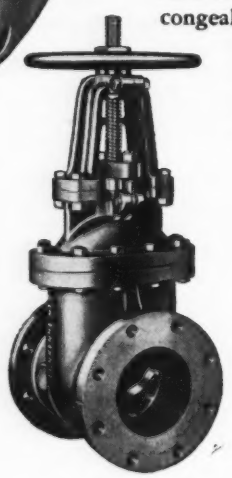


FIG. 1430

Iron Body Bronze Mounted
Also Available in
FIG. 1576 and 1578
All Iron
Screwed and Flanged Types
Fig. 1578N-4
3% Nickel Iron with
18-8 Mo (Type 316) Stainless Steel Trim



Gate valve chatter — the sound of wasteful, accelerated wear — is eliminated by Lunkenheimer's unique method of manufacturing Iron Body Gate Valves. Not only are the guide channels in the disc accurately machined, but the guides in the body as well. These precision-machined guides hold the disc firmly in line — prevent pressure from forcing the disc against the opposite seat. Result: no clatter, no chatter, and much longer valve life. The complete Lunkenheimer Iron Body Gate Valve line includes 3% Nickel Iron Gate Valves (Fig. 1578N-4) designed especially for mildly corrosive service in the oil, paper, and chemical processing industries. They have 18-8 Mo (Type 316) Stainless Steel and Monel Trim to protect the seating faces. All Lunkenheimer Iron Body Gate Valves feature solid discs without pockets that might trap congealing substances in the line. They also have handy swing-bolts and shelves that make repacking easy — are ideal for service in the chemical, petroleum, and pulp processing fields.

WRITE FOR Circular 564, describing the complete Lunkenheimer Iron Body Gate Valve line. Address: The Lunkenheimer Co., Box 360C, Cincinnati 14, Ohio, or phone your Lunkenheimer Distributor.

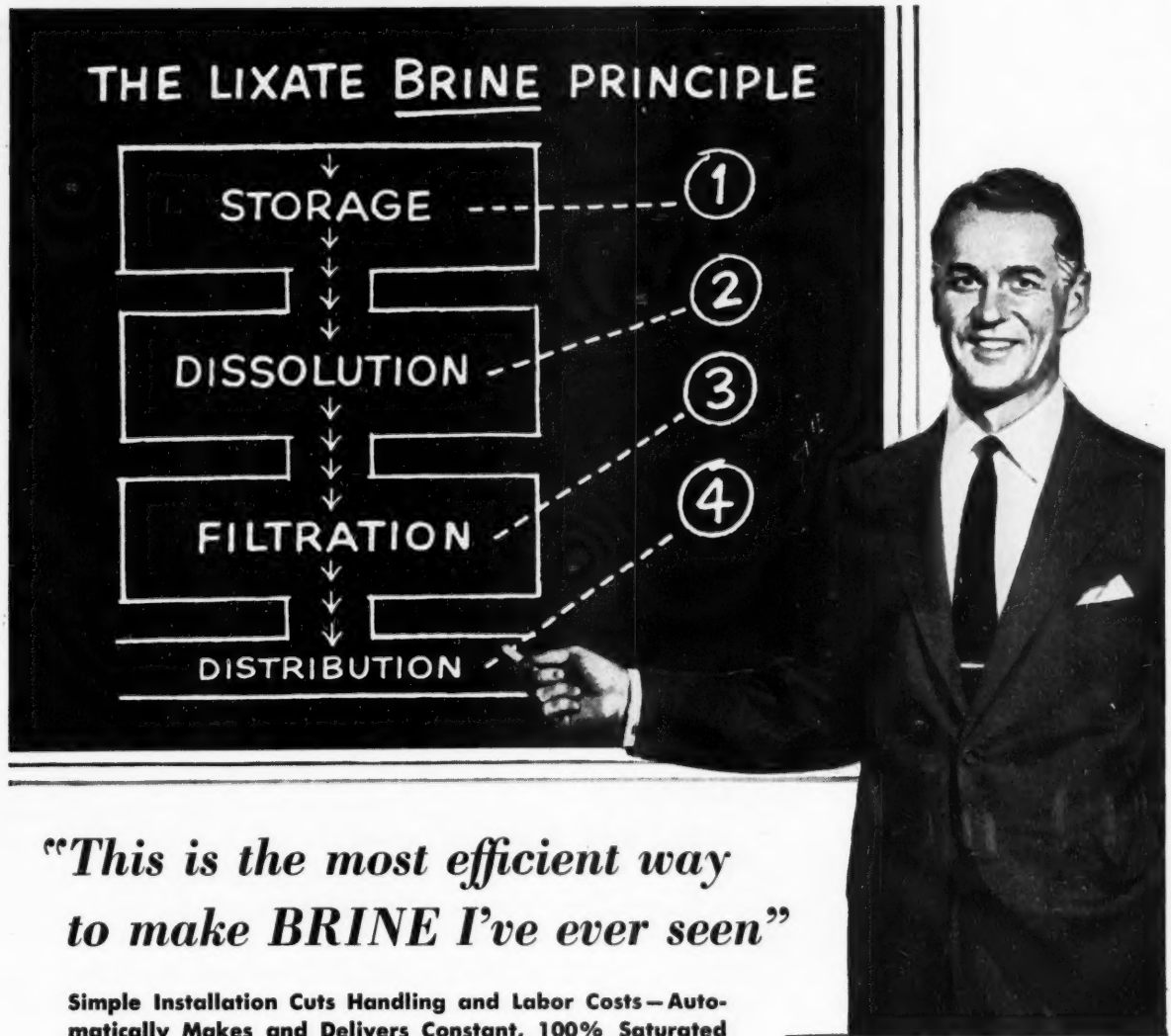
LUNKENHEIMER
QUALITY

IRON • STEEL • BRONZE

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

L-258-9B



"This is the most efficient way to make BRINE I've ever seen"

Simple Installation Cuts Handling and Labor Costs—Automatically Makes and Delivers Constant, 100% Saturated Brine to Any Point in Your Plant at the Twist of a Wrist.

THE HEART of the Lixate Process—developed by the International Salt Company—is the Lixator. Basically speaking, you put Sterling Rock Salt in the top of the Lixator—and you pipe brine out the bottom to any point you want it.

The Lixator can be located near the point at which salt is unloaded—rather than at the point of use—because inexpensive pipe will take the brine to where you want it. This eliminates costly handling from the point of entry to the point of use.

The Lixator makes the brine *automatically*—gravity does all the work. Thus no attention is necessary—you are assured of 100% quality control of your products.

Your brine is always ready. Turn a valve and you have brine at a vat, a cooling unit, a water softener—where you want it, when you want it.

This is crystal-clear brine—more pure because it lacks the impurities and foreign matter so often picked up when manhandling salt.

It all adds up to the Lixate Process being the most efficient, most economical way for you to make brine.

Write today and have our representative call and show *you* how the Lixate Process can be applied in your plant. No cost, no obligation. Write:

INTERNATIONAL SALT COMPANY, INC.
INDUSTRIAL DIVISION, SCRANTON 2, PENNSYLVANIA

SALES OFFICES: Atlanta, Ga. • Chicago, Ill. • New Orleans, La. • Boston, Mass. St. Louis, Mo. • Newark, N. J. • Buffalo, N. Y. • New York, N. Y. • Cincinnati, O. Cleveland, O. • Philadelphia, Pa. • Pittsburgh, Pa. • Richmond, Va.
ENGINEERING OFFICES: Atlanta, Ga. • Chicago, Ill. • Buffalo, N. Y.

HOW THE LIXATOR WORKS

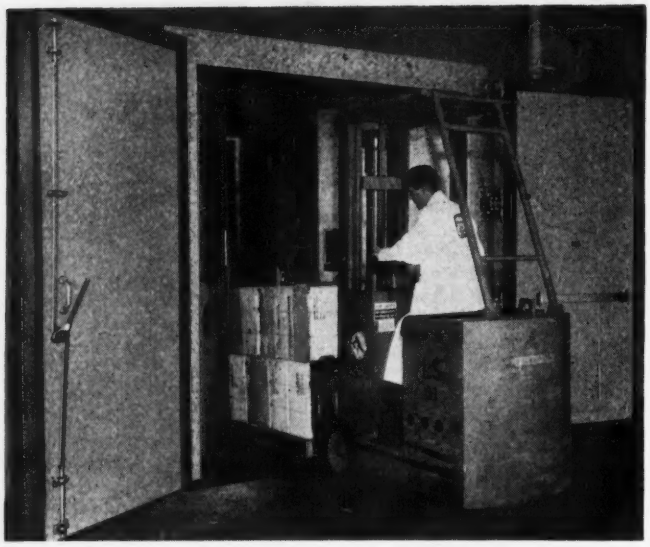
1. Sterling Rock Salt is stored right in the hopper of the Lixator. Automatically, it feeds by gravity to . . .
2. the Dissolution Zone where water dissolves the rock salt to 100% saturated brine.
3. Gravity then filters the brine through a bed of *un*dissolved rock salt and
4. it flows, or is pumped, through the pipes directly to where you need it!

the **LIXATE*** *process*

FOR MAKING BRINE

*Reg. U. S. Pat. Off.

Use coupon on page 227.

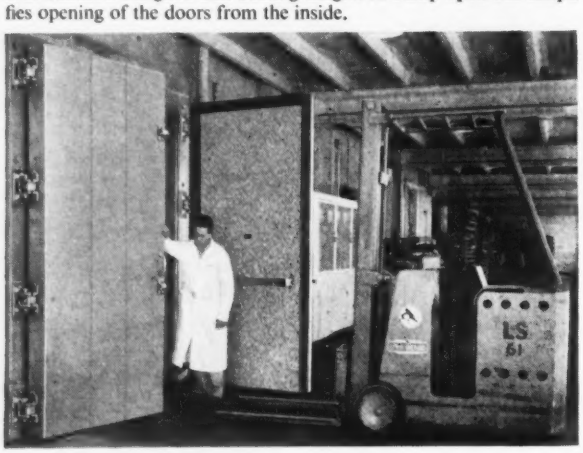


Heavily-Loaded Fork Lift Trucks are Able to Pass through the unusually large openings provided by the Double Super Freezer Vestibule Doors.

JAMISON Double Super Freezer Doors Open High and Wide to Speed Passage of Fork Lift Trucks at BEATRICE FOODS

To Minimize Refrigeration Loss During Handling, a second set of Auto-Close Doors (shown open for illustrative purposes) forms an air lock between each Super Freezer Vestibule Door and the storeroom proper.

One Man Can Open and Close the Huge Doors with ease because of the four Jamison designed ball-bearing hinges. A bump-open bar simplifies opening of the doors from the inside.



Five Jamison Double Super Freezer Vestibule Doors that open off the loading dock give the clearance needed for fast handling of frozen foods at the Denver Stock Yards Plant of Beatrice Foods.

Completely metal-clad, the doors resist weathering and the wear-and-tear of truck traffic. Patented Jamison interconnected two point fasteners assure a tight seal and combine with the unusual insulating efficiency of the doors to prevent refrigeration losses during normal operation.

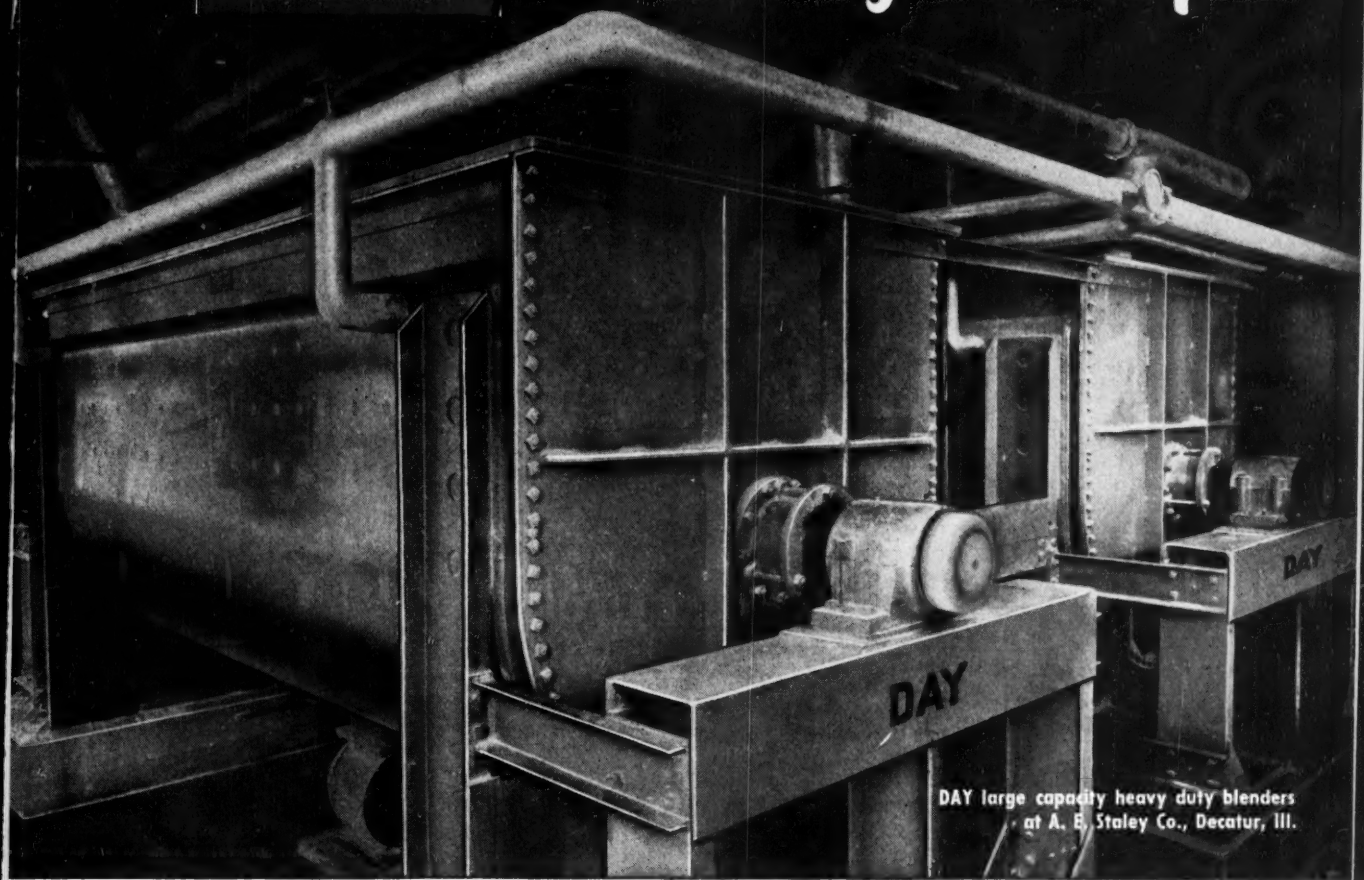
There's a Jamison Door to fit your requirements, too. Consult your architect or write to Jamison Cold Storage Door Company, Hagerstown, Maryland, U.S.A.

JAMISON

HAGERSTOWN, MARYLAND, U. S. A.

More JAMISON Doors are used by *more* people than any other Cold Storage Door in the world.

DAY means longer life span



DAY large capacity heavy duty blenders at A. E. Staley Co., Decatur, Ill.

✽Rugged construction plus precision engineering . . . that's the DAY combination that means *extra* years of trouble-free, economical operation. Plant after plant is finding this true. Whatever your special need, you'll find a DAY Heavy Duty Blender designed for you. Special DAY features on this Heavy Duty Blender have been developed to provide top performance and extra-long equipment life span. The DAY dry color agitator is designed for heavy bodied powders. Other types of agitators are available to meet specific requirements. DAY large outboard bearing construction gives maximum shaft support, smooth operation. Exclusive stuffing box design prevents bearing damage from abrasive materials, and eliminates danger of product contamination by bearing lubricants. The DAY spiral ribbon agitator is designed for paste, semi-paste, granular or liquid products. For complete information or service, call your nearest J. H. Day field engineer or write for Bulletin 354-A.

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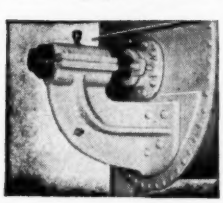
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Cold Sterilization

—Continued from page 71

approximately 5 to 10% of those necessary for sterilization.

On the other hand, 10 times these radiation dosages produce no flavor changes in apple juice.

It should be pointed out, however, that relatively small gross chemical changes occur in these products during irradiation, in spite of the fact that profound changes occur in the acceptability of the products.

It has been estimated that not more than 0.003% of the chemical bonds would be broken with sterilization dosages. This clearly points out the difficulties associated with evaluating the nature of the chemical reactions that occur and the products of these reactions.

For irradiation to be successful as a method of processing foods, it will be necessary for techniques to be devised to circumvent the production of these off-flavors, odors, and discolorations.

Promising are three major techniques:

1. Adding certain agents, such as ascorbic acid, that are more readily affected by irradiation than components of the food product.

2. Using low temperatures during irradiation (irradiating frozen products).

3. Avoiding, as much as possible, the presence of oxygen in the sample or in the atmosphere during irradiation.

Major limitation of the use of these techniques, however, is that in some cases those that reduce the undesirable chemical changes also increase the resistance of microorganisms to the lethal effects of irradiation. Thus, there may be no net advantage to the use of some of these procedures.

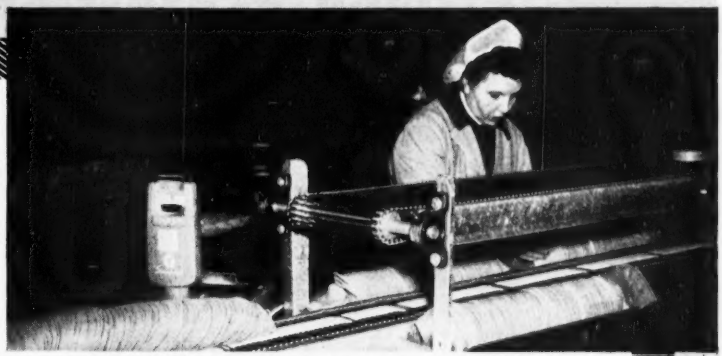
Another major problem: Careful precautions must be taken to protect workers from the rays. Suitable installations for safeguarding personnel must, therefore, be made, adding to the cost. Such installation and handling problems would be particularly important in commercial applications using radioactive materials.

At present, information is insufficient for reliably evaluating comparative costs of sterilization of foods by different methods of irradiation, as compared with heat processing. But these technological problems are getting extensive study.

From a biochemical and nutritional standpoint, these are major problems requiring careful research: (1) Detection and prevention of off-odors, flavors, and discoloration; (2) changes

WENDWAY

LIGHT PRODUCT CONVEYORS



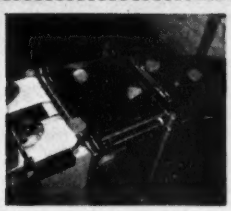
At the rate of 1000 slices per minute, the cold meat emerges from the slicer on Wendway Conveyor to be checked, weighed and placed on conveyor's upper tier for travel to labelling and packaging station.

Cut Meat Handling Costs!

Now you can eliminate multiple handling of products, save man-hours and floor space. You can have remote controlled efficiency in conveying wrapped or unwrapped meats up, over, down and around, to any point in your plant. Wendway's steel wire belting is ideal for handling meats up to twenty pounds per package. It permits free circulation of air from above and below. Does not sag or accumulate fat or grease like *ordinary* belting. Can be kept highly sanitary with hot water, or by direct steam-scalding. Regular bright basic (lacquered) belting is fine for packages. Stainless steel is recommended for unwrapped meats.

Write today for full details on this faster, more efficient method of handling all light meat items.

As sliced cold meats travel by on stainless steel Wendway belting, operator labels each type as they proceed to the automatic package wrapping machine.



As the cellophane wrapped packages leave the wrapping machine they are again conveyed on Wendway system to the box loading station. Wendway conveyor is synchronized to match desired production equipment speeds.

End of the line... the processed and packaged meat has travelled from the slicer to the box loading station on Wendway conveyor in a smooth, steady flow, requiring less handling, less personnel, less equipment ... and doubling production!

WRITE TODAY

Gentlemen:

Please send me additional information about Wendway Conveyors as applied to all types of meat handling.

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Company_____

Address_____ Zone_____ State_____

Have a USP Conveyor Engineer contact me at once_____ ☐

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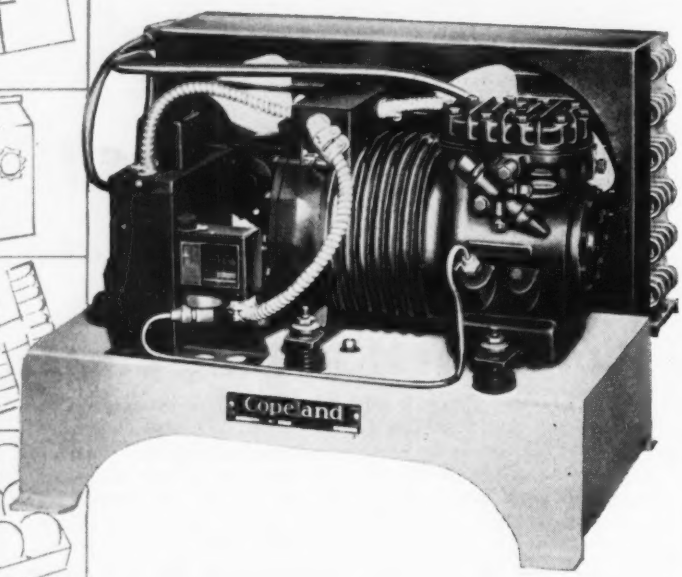

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COPELAMETIC runs, quietly, economically . . . gives consistent high BTU for minimum cost. There are self-contained and remote units for every application.

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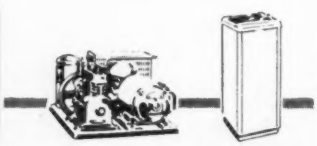
Copeland
DEPENDABLE *Electric* REFRIGERATION



COPELAND REFRIGERATION CORPORATION • SIDNEY, OHIO

brought about by enzymatic and non-enzymatic activities during storage and distribution of the irradiated products; and (3) effects of irradiation on the nutritive value of the foods as well as the wholesomeness of the products (determining if toxic materials are produced).

Under way in this country and abroad is an extensive program of research on the irradiation of foods, pharmaceuticals, and other products. Studies include specific attention to the three problems named above. Experiments seek to determine the chemical changes that occur in foods during irradiation and in purified systems of carbohydrates, proteins, or fats, as well as alterations in the nutritive values of irradiated foods and of specific food components.

In this connection, destruction of vitamins A and C by irradiation has been observed, and further work of this type is merited.

An important part of this program also will be devoted to long-term feeding studies with several species of animals.

Certain other aspects of irradiation of foods are also of interest.

► **Possibilities of using lower levels of radiation to prolong the shelf-life of pre-packaged foods, for example, appear to offer considerable promise.**

Studies conducted in the Divisions of Bacteriology, Physical & Analytical Chemistry, and Biochemistry & Nutrition of the American Meat Institute Foundation, supported in part by the Atomic Energy Commission, have shown that—

► **Shelf-life of pre-packaged meats held under refrigeration may be extended five-fold by the use of low radiation dosages (approximately 50,000 rep.).**

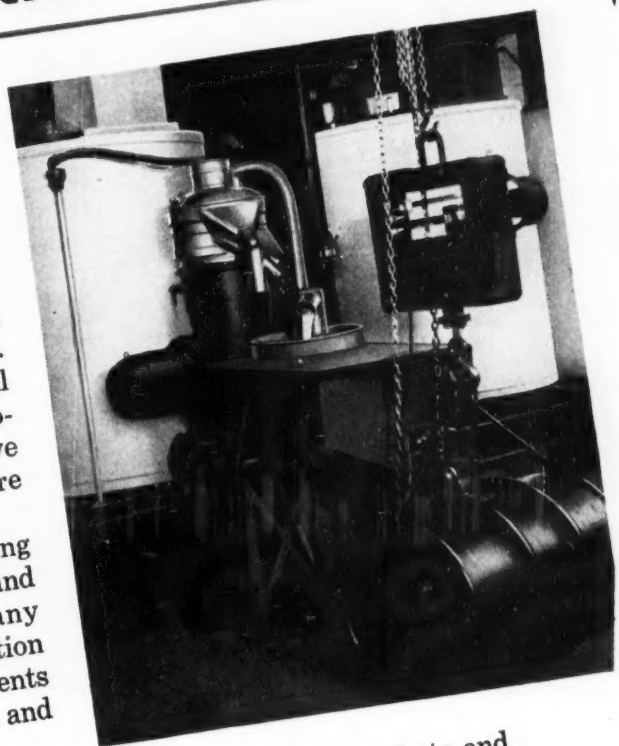
These differences were evident with or without the addition of spoilage microorganisms to the meat prior to irradiation. The meat was kept in moist chambers in oxygen-permeable packages during the experimental storage period at 35.6 deg. F. Little, if any, off-flavors, odors, or discolorations could be detected with this level of irradiation.

Acceptability of such products after storage and cooking has not yet been adequately demonstrated. This work is being continued with the use of a wide range of radiation dosages and sample treatments.

It should be pointed out that chemical changes occur in foods during storage that are not due to bacterial spoilage.

Therefore, even with sterilizing doses, certain enzyme systems are not inactivated, and breakdown of the fats, proteins, and other constituents may occur, during storage, to such

DE LAVAL CENTRIFUGALS
Break Production Bottlenecks



De Laval Separators and Clarifiers *speed* production by making processing *continuous*.

They complete in *seconds* jobs that would take filters or settling tanks *minutes* or even *hours*. *They break production bottlenecks.*

In many instances De Laval Centrifugals not only cut production costs but also improve the product by doing a more thorough job of separation.

De Laval makes centrifuging equipment of various types and capacities to meet the many different separation, clarification and concentrating requirements of chemical, pharmaceutical and food processing.

De Laval Engineers know, by long experience, how to prescribe exactly the right machine to handle each specific job most efficiently and economically. Let them show you, with facts and figures, how De Laval Centrifugals can speed up production in *your* plant.

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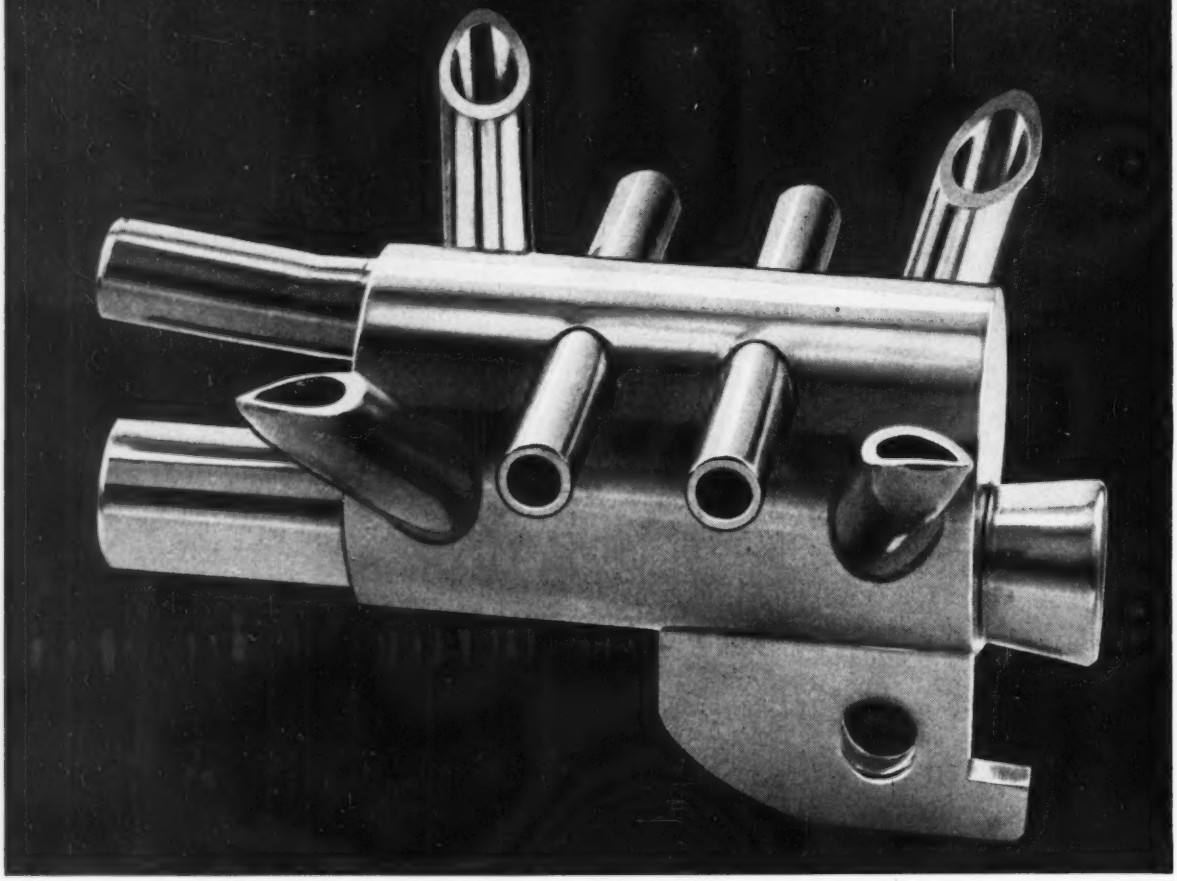

When you need a material that's clean and stays clean . . . want a bright material that needs no additional polishing—specify Carpenter Stainless Tubing.

Carpenter Stainless Tubing is a "natural" for the food industry. This manifold for a milking machine is just one example. Its mirror-like finish stays sanitary with a minimum of cleaning difficulties. It will not stain or corrode even in the presence of acids and strong alkalies.

But sanitation is only the beginning of the long list of advantages Carpenter Tubing gives you. It is ductile, easy to work. It is uniform in dimension, concentricity, wall-thickness, hence, minimizes the need for expensive "hand" operations. Physicals and analysis exceed specifications. In short, there *is* a difference in stainless tubing—and *Carpenter* makes it!

For complete information about Carpenter Stainless Tubing in the analysis, size, quantity you need . . . for engineering or design advice and assistance, 'phone your nearest Carpenter distributor. Or write direct to the mill—no obligation, of course.

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Export Dept.: The Carpenter Steel Co., Port Washington, N.Y.—"CARSTEELCO"

Carpenter

more than corrosion resistance

Stainless Tubing & Pipe

an extent that the product would be unacceptable.

Such reactions may be minimized by proper selection of containers, packaging materials, and chemical additives.

▶At this point, however, it appears possible that a combination of mild heat (to inactivate these enzyme systems) and irradiation may ultimately prove to be the best processing method.

In processing meat, other techniques, in addition to irradiation, are being studied at the Foundation. These include dehydration and diathermal processing, which are being studied by the Divisions of Histology and Physical & Analytical Chemistry. *End* (*Resume reading on page 72*)

New Map Technique

—*Continued from page 93*

products from the Armour refinery at Chattanooga, Tenn., to the Birmingham, Ala., branch.

Originally, the truck making the delivery to Birmingham returned to Chattanooga empty. But study of the map indicated that on the days in question the Birmingham branch transported products 150 miles to the Chattanooga branch. This truck, returned empty.

There was the answer. Now one truck travels between the two cities fully loaded both ways. And as a result, trucking costs were halved.

In yet another case, the firm's Louisville creamery dispatched a small truck with dairy and poultry products twice a week to company branches at Logan, Williamson, Norton, Bristol, and Pikeville. The map showed that there was another weekly run from the Louisville branch carrying sausage products to these very branches with the exception of Norton. And so today, one larger truck totes both dairy and sausage products to all branches.

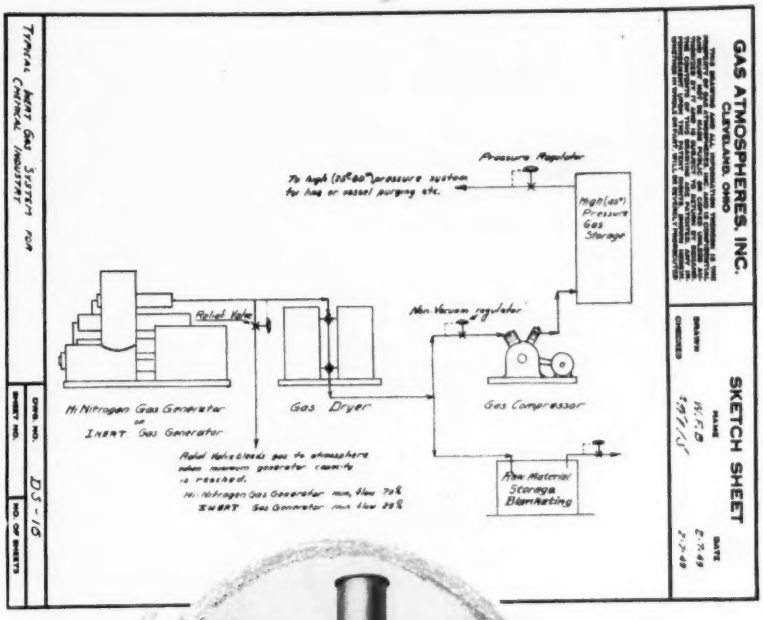
At one time, too, products were hauled to a break-bulk point 100 miles from the Chicago plant, reloaded into smaller trucks, and then hauled to some dealers who, actually, were only 30 miles from the plant. With rescheduling, these specific dealers now are served in a direct route.

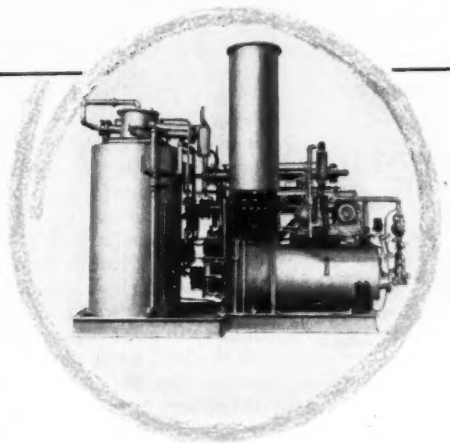
Also, when a four-lane highway was opened up down the middle of one territory, all stops were re-arranged to make the fullest use of the new road, saving both time and mileage.

To develop the maximum transportation efficiency between the different Armour units, transportation and distribution offices have been established in New York City, Chattanooga, and San Francisco.

BETTER CANNING BEGINS HERE

More progressive canners every day are turning to inert gas packaging as the surest, most efficient method of modern food canning.





The plan and generator shown here are saving thousands of dollars for a leading food canner.* And he reports higher product quality.

*Name furnished on request.

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Continued meetings of executives representing the transportation and distribution division and the company sales organization are seen producing many additional economics through virtue of these very practical data.

End (Resume reading on page 95)

Dehydration Advances

—Continued from page 76

cost estimates indicate that the price would be comparable to that of producing canned, commercially sterile product. Further, the dehydrated meat approaches the flavor and texture of fresh meat to a much greater degree than do canned items.

It is evident that a dried meat item, capable of being easily rehydrated and having a flavor and texture resembling that of fresh meat, would have tremendous value for military rations. Indeed, the QM Food & Container Institute is engaged in extensive exploration of these possibilities.

Use in emergency and disaster rations might easily be the largest outlet for dehydrated meat items. They should prove to be a highly nutritious source of protein and energy.

Value of such items to the civilian market is somewhat more problematical and perhaps less universal in scope. They should, however, be a boon to the often-overburdened sportsmen because of light weight and ease of preparation. And perhaps meals containing dried meat could complement the current pantry-shelf items, giving the housewife a greater variety.

It should be made quite clear, however, that such dehydrated meats are not at present marketable items, since much still must be done to bring them to the high levels of flavor and palatability that the public is accustomed to getting from reputable processors.

Use of desiccants in vacuum ovens or in the packages may serve to shorten the time needed to prepare a suitable dried item. And fundamental studies on chemical changes that take place in the protein and fat during storage may provide clues for resolving the problem of flavor and texture deterioration.

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End (Resume reading on page 77)

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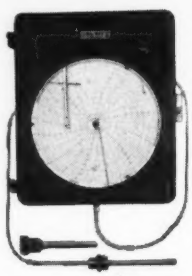
Temperature Indicating Instruments



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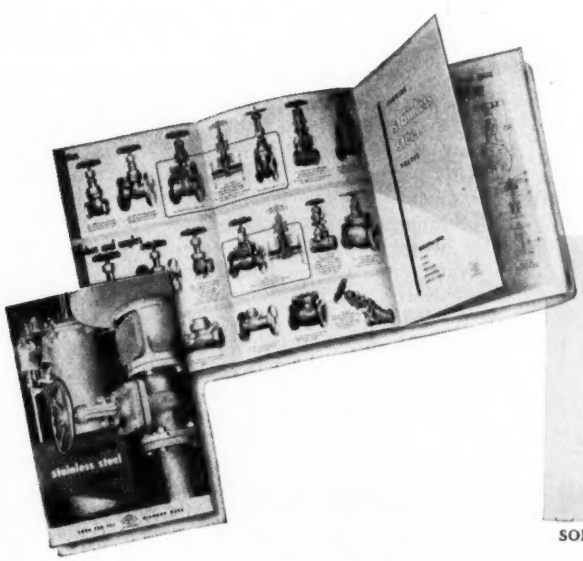
With the increased demand for processing equipment that resists corrosion, more and more Stainless Steel Valves have been added to the Jenkins line. It now includes types, designs, sizes and alloys to meet practically all industrial needs.

Let the famous Diamond trade-mark be your guide when you choose valves of stainless steel. As on *any* Jenkins Valve, it means *extra value* . . . longer, trouble-free service life.



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. . . anywhere on this smooth running, vibrationless Hamilton CG Mix Cooker.

Precision made cut gears quietly drive the double motion agitator in a wide range of speeds. Counter rotating shafts assure maximum circulation of your product. Nylon scrapers blend hot surface film with every revolution.

The kettle construction incorporates all possible sanitary features. Stainless steel, highly polished with agitator fixture and motor housings of baked white enamel. Adjustable tubular legs flow into kettle with no crevices for food residue to collect.

For the utmost protection of your product's consistency, color and flavor, for economy of operation with extra long life, your best investment is the newest addition to the comprehensive line of Hamilton Kettles . . . the CG Mix Cooker, in capacities of 30 to 500 gallons, 90 to 125 p.s.i. — 2/3 steam jacketed.

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Hamilton copper and brass works

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Chub Packaging

—*Continued from page 77*

viscous ones such as the various sandwich-meat spreads.

Flow of product—and thus the weight—into continuously formed tubular-type saran packages is controlled by a sanitary positive displacement-type metering pump, with a variable-speed drive and a ¼-hp. motor. Speed of saran film—100 gage and double-wound—also is controlled by a variable speed drive, with power from a ⅛-hp. motor.

Roll-fed saran is roller-guided to a stationary folding device directly over the combination tubular-shaped package former and filler. Film forms into a tube around the pipe-like mandrel, while product is fed through the tubular mandrel and into the package.

And as the film forms around the tubular-mandrel, the overlapped side seam passes between two electrodes of a radio-frequency dielectric heating device for electronic sealing. Product is actually filled into the saran tube as it is pulled over the tubular mandrel by a pair of rolls.

Package is completed by a reciprocating-type jaw sealer that simultaneously squeezes excess product from the bottom end of the upper package and the top end of the lower package. Same device, driven by a ¼-hp. motor, aluminum-clip-seals both ends. And a built-in knife snips between the two sealed ends to separate the packages. Aluminum wires are roll-fed from two spools. Finished packages are then either chuted into a container or onto a conveyorized packing belt.

End (*Resume reading on page 78*)

Fission Irradiator

—*Continued from page 80*

could reduce the annual cost to $131,090 and the cost per pound to 1.87 mills. Even 2.13 mills/lb. or $0.29/hog would be a small price to pay to aid in wiping out the problem of trichinosis.

In choosing a source of gamma radiation for this design, mixed fission products of various ages are considered and compared with cesium-137. The "mixed" fission products are defined as the mixture of radioactive elements resulting from the fission of uranium after separation from process wastes. Since the composition and activity of the mixed fission products vary with their age, mixtures of various ages must be considered.

In general the mixed fission products have the advantage of being available in much larger quantities than cesium-137, which is present to only about 6.2% (atomic) of the mixed fission products for short reactor operation time. This percentage is somewhat higher for realistic reactor cycles.

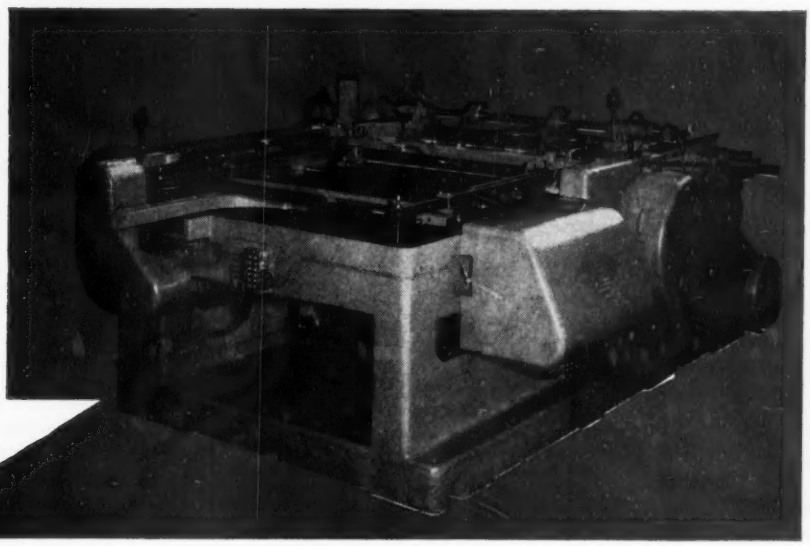
The other important gamma emitters—zirconium-95, its daughter product columbium-95, and cerium-144—have much greater gamma activity than cesium-137. However, using cesium-137 instead of mixed fission products has numerous advantages.

We have listed the constituents of mixed fission products at 3 and at 24 months (Tables II and III) after removal from a reactor, including all isotopes present in excess of 1%. Cesium-137 contributes 4.0% of the activity after two years.

The factor limiting specific activity is the rate of heat absorption within the source material. This absorption is chiefly the result of beta particle activity. An upper limit of 10,000 total curies per pound has been suggested from these thermal considerations.

If you want lower cost body blanks, join the swing to this modern

HAMILTON 401 DUPLEX SLITTER



Here's one of the "hottest" new machines in Hamilton's complete line of modern, high-speed can-making machinery. And we're not a bit surprised that it has been such a "smash-hit" . . . ● The big demand for our 401 Duplex Gang Trimmer and Slitter confirms our belief that a faster, better slitter is needed to permit increased can production. ● This Hamilton 401 Slitter is so very advanced that it has made obsolete other slitters as new as five years old. Here are four specific reasons why it'll pay you to switch to our modern 401:

1. Its *streamlined*, simplified design provides maximum accessibility and easy adjustments.
2. *Sturdier*, more rigid construction means far less downtime. Both units are mounted solidly on a massive, heavily reinforced base to prevent distortion and misalignment.
3. It's about *40% faster* than other "new" slitters and easily meets the need for higher production rates.
4. *Greater accuracy* is assured by its ruggedness and precise gauging. It exactly duplicates litho press gauges. It'll cut your rejects and improve your product quality.

For further facts about the 401 Slitter or other machines in Hamilton's complete line of equipment required for making all kinds of cans, please write to:

Hamilton Division, Hamilton, Ohio

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FOR FIVE, CLEAR-CUT REASONS IT PAYS TO KNOW PARTLOW

Take RECORDING CONTROLS, for instance

SEND NOW for new condensed Catalog CC. See the seven different Partlow Mercury-actuated Recording Controls — designed to give you automatic process control, continuous temperature indication, permanent records, limit arrangements and hazardous location applications. Select controls tailor-made for your equipment — gas, oil, steam, water or electric. Available with electric or spring-driven chart drives — 24-hr., 48-hr., 7-day or any given cycle . . . 10 temperature ranges from −30° F to 1200° F.

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2. **INTERCHANGEABLE ELEMENTS** — for quick, easy field replacement, without returning control to factory.
3. **ACCURATE CALIBRATION** — conservatively, within 1% of scale range.
4. **LONG LIFE** — thick-walled capillaries and seamless tubing assure almost indefinite life.
5. **LOW MAINTENANCE** — few moving parts — no need for compensators.

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If mixed fission products are concentrated to 10,000 curies per pound, the useful gamma-emitting isotopes will be present to the extent determined by the percent composition.

The specific activity in curies per pound of each gamma-emitting isotope is listed in the fourth columns of the tables. The total gamma specific activity is plotted in Fig. 1 as a function of time after removal from the reactor. Fig. 1 shows that the optimum storage time, from the point of view of useful gamma activity per 10,000 curies of total activity, is approximately six months.

Using identical geometrical configurations, a gamma source containing 6-month-old mixed fission products would have to be 1½ times as active (including both beta and gamma activity) as a gamma source containing cesium-137 to produce the same levels of gamma radiation in air.

The absorption characteristics in meat of the complex of gamma energies from mixed fission products must be considered. Fig. 2 illustrates the absorption characteristics of each important component as well as the total absorption.

The resultant total absorption does not differ appreciably from that found for cesium-137. A gamma source containing 6-month-old mixed fission products would approximate the absorption efficiency of a source containing pure cesium-137.

As a practical consideration in operation of a radiation facility, the radiation flux must be kept from dropping excessively in order to prevent drop in capacity. Assuming that a 10% drop in flux is permissible, then ⅛ of a source containing 6-month-old mixed fission products must be replaced every week. For 1-year-old fission products this minimum replacement period is lengthened to 2 weeks, and for 2-year-old material to 5 weeks.

Replacement of high-level gamma sources is expensive, time-consuming, and dangerous, and therefore must be minimized. Prolonged storage of the gross fission products, however, tends to increase the cost per curie for two reasons: First, expensive storage facilities must be constructed and maintained. Second, the "natural" specific activity decreases tremendously, and the degree of processing required to achieve 10,000 curies per pound is increased.

The mixed fission products have a short effective half-life during the first 2 years of decay, when they have high gamma activity. If the mixed fission products are allowed to decay for 4 years, about half the gamma radiation will be from cesium-137. However, for a given weight, such a source of 4-year-old mixed fission products would have only about 10% of the gamma activity of separate cesium-137, as a result of dilution by the other fission products and their decay products.

If the values of the two sources are compared on the basis of replacement of activity without regard to shipping and installation costs or to the differences in interest on the investment, the cesium-137 will have a value as a source of radiation 250 times as great as 6-month-old fission products.

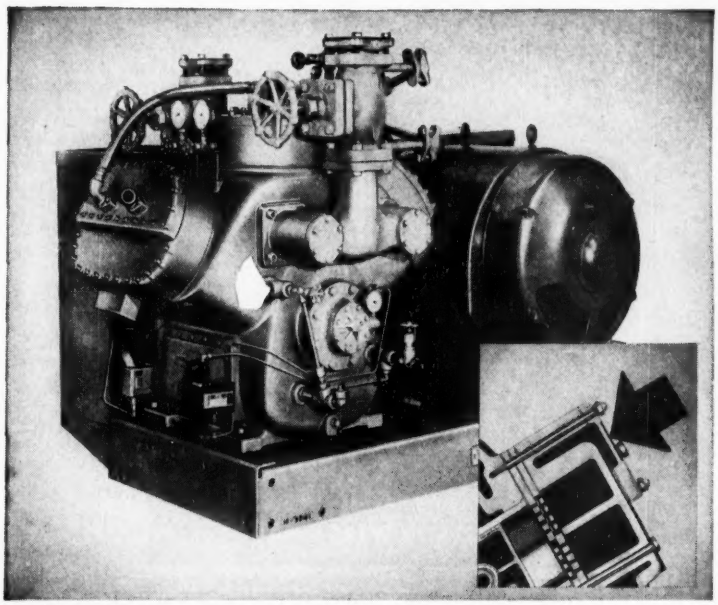
Thus, if the 1.5 megacuries of cesium-137 used in the pork irradiation facility described herein has an initial value of $483,000 (as calculated in the section on design), the corresponding value for the 6-month-old mixed fission products would be $483,000/250, or $1,930 for 1.5 megacuries of 6-month-old mixed fission products.

It appears very unlikely that 1.5 megacuries of mixed fission products could be concentrated and prepared into a suitable source for $1,930. Furthermore, the shipping and installation cost associated with replacing 0.25 megacurie every week would, in itself, appreciably exceed $1,930.

The above article was taken from a paper presented at the Nuclear Engineering Congress held at Ann Arbor, Mich., June 21-25.

End (Resume reading on page 81)

Look at all the features of Worthington's new high-speed ammonia compressor



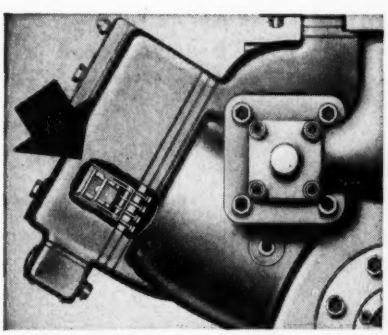
IMPROVED INTERNAL MANIFOLDING—cool suction gas completely surrounds the cylinder walls, providing longer valve life and increased overall efficiency. All passageways between suction discharge and shutoff valves are cast integrally within the crankcase, eliminating outboard fittings. Cross section shows water jacketing on one of the cylinders.

High operating efficiency and lighter weight make this modern unit the talk of the industry

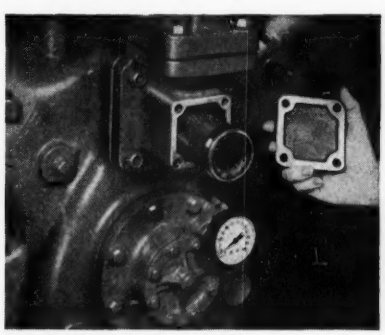
These lightweight, compact Worthington ammonia compressors have the same high operating efficiency and versatility as their lower speed counterparts.

Ranging in capacities from 18 to 150 tons, the new units can be used as high-stage or booster machines.

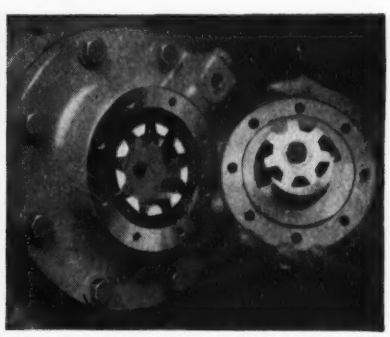
Get in touch with your nearest Worthington district office for more facts about these rugged compressors. Or write to Worthington Corporation, Air Conditioning and Refrigeration Division, Section A.3.56, Holyoke, Mass.



ELECTRIC UNLOADING—a new achievement in variable capacity control. You can start compressor with a normal torque motor; power consumption is automatically balanced against load. Separate unloader units allow easy maintenance . . . no oil or gas pressure lines to worry about.



NEW SUCTION MANIFOLD, with cover plate over suction strainer inlet, allows easy removal of the suction gas strainer for cleaning, without disturbing any of the pipes, valves or other parts. The strainer is unique in that it fits entirely within the crankcase manifold, requiring no additional space.



NEW FORCE-FEED LUBRICATION SYSTEM—full pressure, positive lubrication, regardless of rotation. A new rotary oil pump, driven directly by the crankshaft, eliminates complicated and noisy gear trains. Oil is filtered through a strainer in the crankcase for protection of pump and other moving parts.

A.3.56

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CLIMATE ENGINEERS TO INDUSTRY, BUSINESS AND THE HOME

Slice Frozen Fish or Meat

quickly and safely . . . directly from freezer with amazing speed and slice uniformity—

WEBER *hydraulic* FROZEN FOOD SLICER

Sanitary, cuts frozen fish sticks, meats and other foods without pre-thawing or shrinkage . . . Preserves flavor and natural juices.

- Powerful hydraulic operation with overload protection . . . waterproof electrical compartment
- Hopper or magazine type automatic gravity feeding . . . under machine delivery
- Safety devices throughout, plus complete encasement for added precaution
- Only stainless steel or dairy metal parts come in contact with food
- No machine crevices or joints to collect bacteria
- Welded steel red enamel finish body, stainless steel top and feeders
- Easily removable complete hydraulic unit permits instant replacement
- Absolutely no sawdust or waste.
- Sanitary, entire unit may be steam cleaned without damage

Used by leading meat packers, fisheries and frozen food processors from coast to coast. Write for detailed information.

FROZEN FISH SLICER — Adjustable feeding magazine for sticks operates at 50 strokes per minute for single or multiple piece production. Variable slice thicknesses, according to specification.

STANDARD MEAT SLICER — 9" x 22" hopper opening. Slices 20 cuts per minute. Same size Heavy-Duty model cuts 28 per minute. Slices adjustable for ¾" and 1½" thick — other thicknesses available on specification.

LARGE MACHINE: Magazine feed fish slicer

SMALL INSERT: Hopper feed meat slicer

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UNIVERSALLY ACCEPTED

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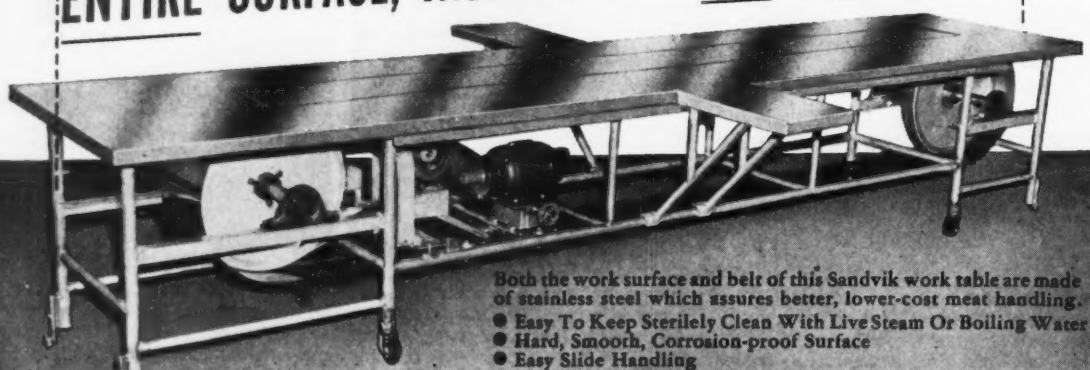
In this SANDVIK Conveyor Table the . . .

ENTIRE SURFACE, INCLUDING THE BELT IS STAINLESS



Sandvik Stainless-Belt Work Table in operation at Ottman & Co., New York.

Both the work surface and belt of this Sandvik work table are made of stainless steel which assures better, lower-cost meat handling.

- Easy To Keep Sterilely Clean With Live Steam Or Boiling Water
- Hard, Smooth, Corrosion-proof Surface
- Easy Slide Handling
- No Place For Particles To Lodge
- Tru-Tracked, Straight-line Operation

Why not discuss your meat-handling problem with your nearest Sandvik representative. He can give you information on the type and size of Sandvik Conveyor which will fit your application.

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Manufacturers Of Steel Belt Conveyors For Over Thirty Years

TIMKEN® bearings on high-speed seamer show no wear after 80 million closings

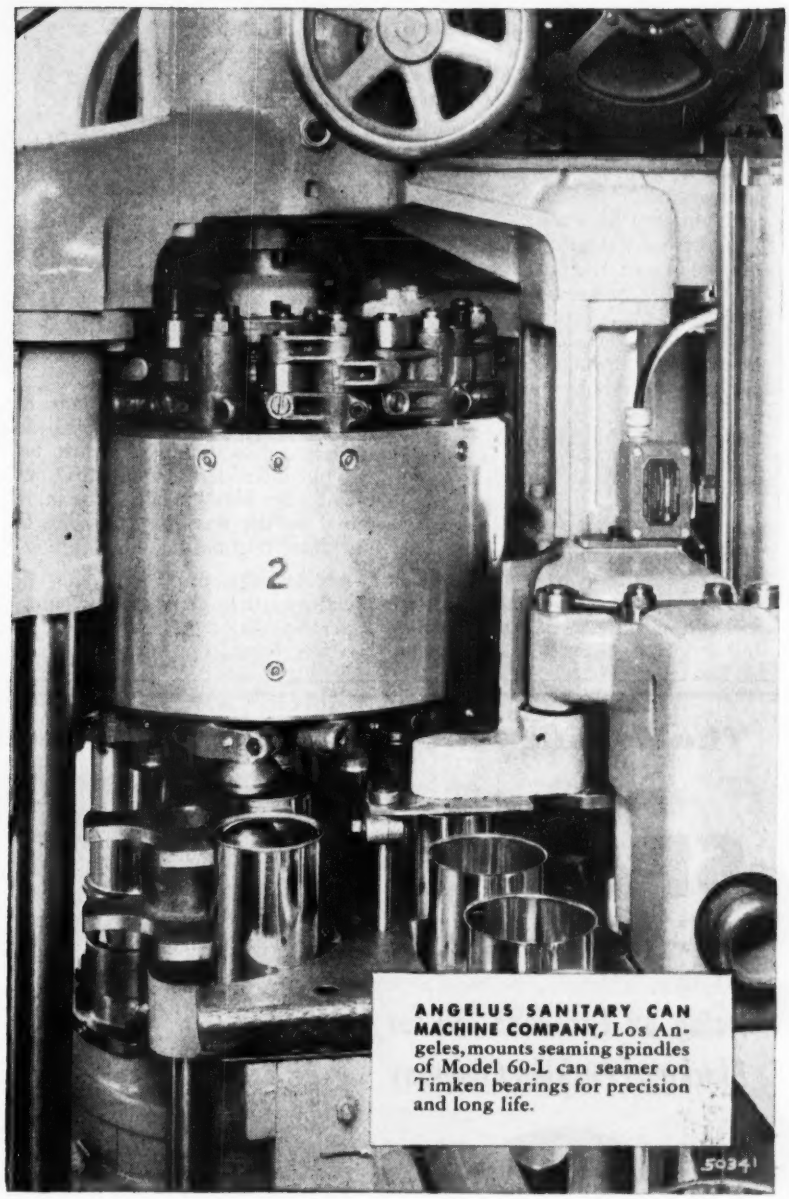
AFTER seaming 80,000,000 cans (food enough to feed Kansas 11 days!), an Angelus 60-L Seamer like the one shown was returned for factory check. In the Timken® bearings used in the seaming spindles—heart of the machine—*no looseness or end play could be observed!* The seamer was returned to service without change in the bearing setup.

To insure good can sealing, spindle end play has to be prevented. Timken tapered roller bearings do just that. Tapered construction lets Timken bearings take both radial and thrust loads in any combination. Full line contact between rollers and races gives Timken bearings extra load-carrying capacity. Spindle is held in rigid alignment. This maintains closer tolerances in the canning operation, results in fewer rejects.

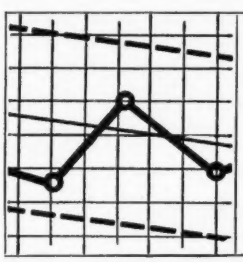
Why do Timken bearings last so long? Because they're designed to roll true and precision manufactured to live up to their design. We even make our own steel. It's the only way we can be sure it's good enough for Timken bearings.

For the least in friction and maintenance and most in long life, always specify the bearings with the trade-mark "Timken". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



ANGELUS SANITARY CAN MACHINE COMPANY, Los Angeles, mounts seaming spindles of Model 60-L can seamer on Timken bearings for precision and long life.



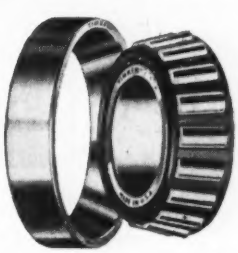
STATISTICAL QUALITY CONTROL

To insure uniform high quality and closer tolerances, the Timken Company uses statistical quality control. With it, tolerance deviations are plotted graphically. It's one of industry's newest, most scientific methods of improving product uniformity.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⬯ AND THRUST ⬯ LOADS OR ANY COMBINATION ✳

Saves Retort Steam

—*Continued from page 98*

door frame, two curved metal straps are welded—one behind each bolt hinge—to the back of the door frame. When the bolt is swung back prior to opening the door, it hits this strap instead of the insulation. It is curved back enough to prevent the bolt from falling back into the door slot but not far enough to allow it to hit the insulation. These straps also provide a means for fastening the formed metal channel serving as support for sheets at the front of the retort.

If it is desired to assemble the insulation in such a manner as to necessitate removal of only one section in the case of subsequent repairs, the double-fold frame should be used or the top sheets should be cut into pieces to cover only one section at a time by using a single fold and "flat" frame.

If speed of installation is of primary concern, one sheet (width and length of the retort) can be fastened to the top and sides of the retort at the "flats" of the frames. Sheet to be used for the top of the retort must be wide enough to allow a 90-deg. bend a few inches from the edge of the sheet, the full length of the sheet, so that no space will form between the top and side sheets.

Should it be decided to cover each section separately regardless of the frame used, inside and outside sheets should be bent to a U-shape to allow continuity of surface and to minimize need for joints where top meets sides.

These designs, based upon four reflecting surfaces and two stagnant air voids, should provide for surface protection as well as cleaning ease. To prevent corrosion of aluminum of this thickness, a protective plastic coating should be sprayed or brushed on (that supplied by NuSteel Chemical Co. was used on our experimental units).

In any event, the surface should be kept clean to maintain as high a reflectivity as possible. With high reflectivity (low emissivity), there would be little increase in heat loss due to radiation, even if only one air pocket were to be provided.

While the surface temperature of the sheet would be increased and the total heat loss would be greater because of the increased convective loss, even so the heat loss would be minimized by the very low emissivity of the clean, bright aluminum sheet.

Acknowledgment: The author of the above article, designated as Journal Paper No. 98 of the American Meat Institute Foundation, expresses gratitude to George Koch, plant superintendent, and Edward Clair, president, of Republic Foods Co., for the cooperation in application of the insulation discussed, thus making it possible to design and test the various assemblies.

End (Resume reading on page 100)

Unit-Task Improvements

—*Continued from page 85*

of Nylon strings attached to a pair of horizontal ring gears (one stationary and the other rotary) twist the film around the product. A reciprocating-type 2¼-in.-dia. head, with an electrically heated wire, cuts off the film, and a tight-fitting package is formed.

Affixed to these packages are pressure-sensitive labels coded for a 10-day expiration date.

To make the most of ceiling space, an overhead carton-storage area (7x10x 35 ft.) has been built in the loading dock. Area is constructed with 2x6's spaced 18 in. apart and 1x3's spaced 3 in. apart on the bottom. Storage area is about 8 ft. above the dock, and it is accessible by a retractable stairway.

Three recessed lights (150w. bulbs) in the loading dock lighten up the first interior of the trucks to facilitate loading or unloading operations.

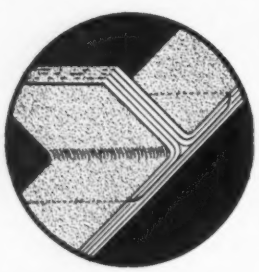
End (Resume reading on page 87)

The Belting the Meat Industry Looked for — and FOUND!

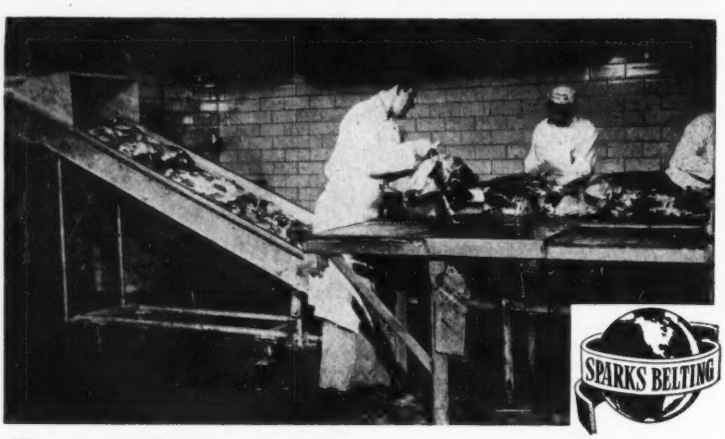
SPARKS

"Golden-Tex"

Doing an Excellent Job for Blackport Packing Company



SANI-CLEATS The most advanced step in food conveying. Solves cleated belt problems. Write for complete information. Patent pending.



The picture illustrates one of the meat processing operations of the Blackport Packing Company of Grand Rapids, Michigan, where Sparks "Golden-Tex" conveyor belts speed up the work as they carry raw meat from one level to another for further handling.

The outstanding feature of "Golden-Tex" is its sanitation, its odorless cleanliness — thoroughly impregnated against oils, greases, juices and heat, and is highly resistant to bacterial development . . . Easily cleaned with hot water or steam. Ideal for the sanitary handling of food products.

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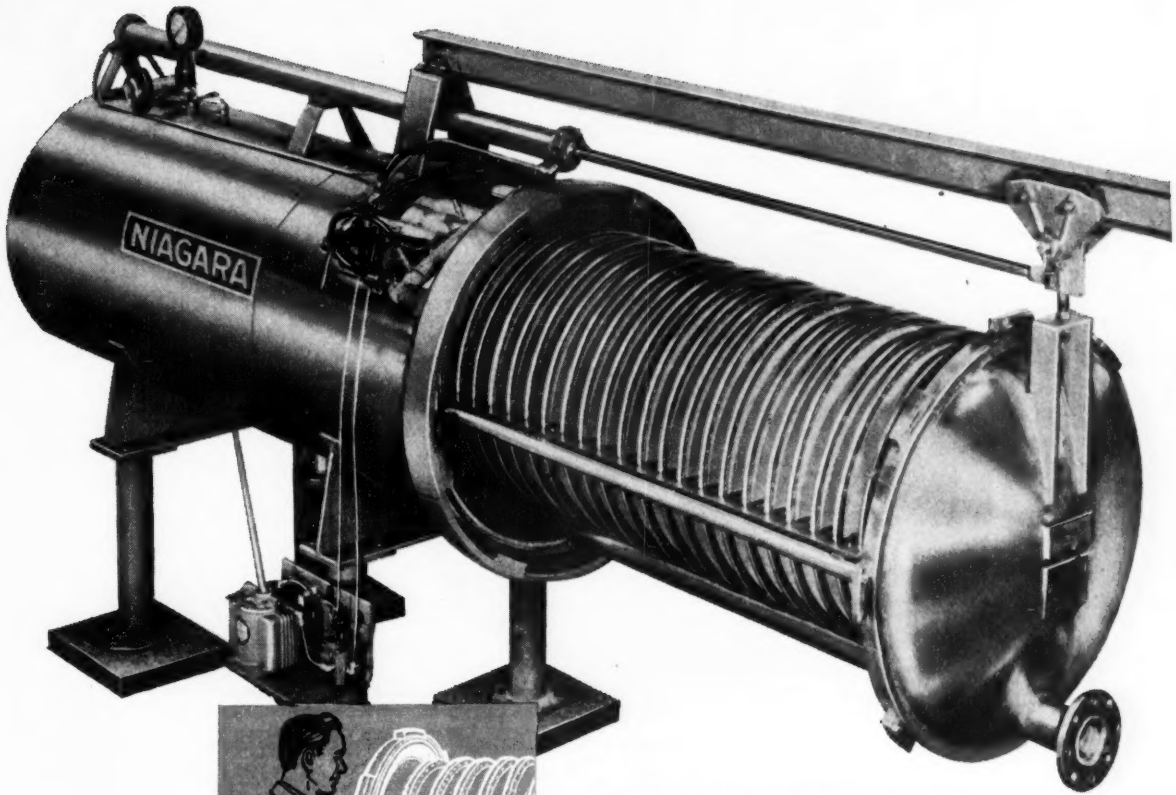
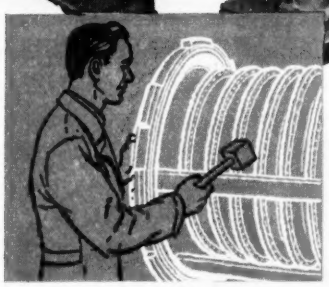
862-64 Grandville Ave., Grand Rapids, Mich.

HAULTAIN-CHAMPION 320 East 8th St., Oakland, Calif.

D. E. SHIPP BELTING CO. 1507 Franklin St., Waco, Texas





Crucible stainless steel, used by American Machine & Metals, Inc., in the fabrication of Niagara Horizontal pressure leaf Filters, assures ease of cleaning, long service life.

horizontal filters built with CRUCIBLE STAINLESS STEEL are EASY to clean... HARD to wear out

When solids have to be separated from liquids . . . when semidry cakes must be dislodged quickly and easily . . . and where minimum down time is vital—there's no unit like a horizontal pressure leaf filter. And when its materials must be strong enough to take rugged, continuous use without undue wear—there's no material like Crucible Rezistal® stainless steel.

In operation, horizontal filters like the one shown here, are cleaned by rolling out the leaves, and tapping with a rubber hammer. Crucible stainless leaves require no cloths—and seldom *or never* need to be replaced.

The story's the same with any process equipment. When you're choosing equipment that must stand up under heavy production schedules—take advantage of the proved reliability of Crucible stainless steel. Remember, too—Crucible . . . the world's leading producer of special purpose steels . . . is always ready to help you plan for new and different applications of stainless. So, for help of any kind—*call Crucible.*

Get this new 44-page Crucible book, "Making the Most of Stainless Steels in the Chemical Process Industries." It's full of information you'll be able to use in your daily work. Write today for your copy.

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CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

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AT THE AMI

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For more than 155 years, Dodge & Olcott, Inc. has supplied to various segments of the food industry, flavoring materials of unsurpassed excellence. D & O essential oils, oleoresins, and specialty flavor lines are known and respected throughout the trade and D & O's reputation for individual service, technical assistance, integrity, tradition and experience are unexcelled. Now, as a further service to the food processing industry, D & O presents its newest development . . . a complete line of DRY SOLUBLE SEASONINGS under the trade name SPISORAMA, tailor-made to the requirements of the trade.

Visit Booths No. 25, 26, 27 at the Palmer House, October 8–12. See the D & O "WORLD OF FLAVOR" . . . and receive the special, "individualized" A.M.I. souvenir that will be waiting for you at the D & O Booth!

You are cordially invited to attend as well the D & O Hospitality Suite Nos. 728 & 729 in the Palmer House.

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RESULTS OF AN INTELLECTUAL REVOLUTION . . .

"The Western Miracle" Continues . . . More Automatic Controls for Industry

Within recent weeks three new monthly technical magazines devoted to automatic control systems for industrial processes and machinery have offered the public their first issues. One of these is CONTROL ENGINEERING, a McGraw-Hill publication.

What has caused this surge of interest in the design and application of automatic control systems? What does it portend for the future of American industry? More important, what does it promise for the American standard of living, of which industry is and must be the servant? And what is the role of CONTROL ENGINEERING in this development? It is to those questions that this statement is addressed.

A New Intellectual Revolution

It is frequently asserted that we are now in the throes of a new industrial revolution. The revolution is described as the eliminating of wasteful applications of human labor to repetitive tasks through new technology which makes it possible to transfer those tasks to automatically controlled machinery.

It is perhaps more accurate, however, to say that we are the beneficiaries of a new intellectual revolution in the application of science to industry. This new intellectual revolution points the way toward giant strides in the continuing process of taking dull and laborious work off the backs and minds of men and transferring it to machines operating in large batteries under automatic control.

The practical engineering work required to convert this intellectual revolution into a full-scale industrial revolution, however, in large part still remains to be done. It is to this task that CONTROL ENGINEERING will be devoted. Its role is that of bridging the gap, in engineering and economic terms, between the new conceptions of automatic control of industrial processes and their practical workaday application. These conceptions run the full gamut from systems of control for automatic factories making heavy industrial products to highly personalized systems of automatic control to warn people when they are approaching the broiling point in sunning themselves at the beach or becoming too drowsy to drive their cars safely.

Enter the "Feed-Back" System

Enough work has been done to move these conceptions out of the realm of interesting dreams and into the realm of practical possibilities, and in some cases into the realm of practical realities. Crucial parts of this work were done during World War II when weapons were successfully equipped with "feed-back" systems

that automatically corrected mistakes made by the weapons in locating their targets.

The principle of the "feed-back" system is as ancient as the personal monitor that tells us not to run into each other as we walk along the street. It feeds back to our locomotion machinery the warning of a collision ahead. But the application of the principle to weapon control and then to more general machinery control required superlatively imaginative and skillful scientific development.

When a "feed-back" system that monitors an automatic process and keeps it lined up precisely is teamed up with a computing machine, capable of making lightning calculations that control both what goes into the process and what is done with the product, the horizons of automatic control become broad indeed. But in large part they still remain horizons. A vast range of practical engineering work remains to be done to realize anything like the full potential of automatic control of industrial processes and machinery.

More and Better Jobs

There are those who view the surge of interest in automatic control with alarm. They conjure up a situation in which automatic processes will at once expand the ranks of the unemployed and reduce many of those still working in industry to the status of robots or automatons.

A look at the record of the American economy — a record of amazing growth, steadily improving job opportunities and a constantly rising standard of living — demolishes the basis for such fears. The introduction of new and more efficient industrial machinery and processes obviously cannot be accomplished without creating some disturbance for some individuals and some companies. But consistently the longer range effect of such local and temporary disturbance has been more jobs and better jobs for Americans.

It is no accident that, while the proportion of industrial wage earners in our population is virtually the same as it was in 1920, the proportion of professional and salaried workers has doubled. The proportion of unskilled workers, furthermore, has dropped by half. This has been an essential part of a continuing process by which drudgery has been transferred to machines while the workers who formerly did the drudgery have been graduated to jobs calling for greater competence and providing better pay.

Higher Living Standard

A British historian, H. J. Hancock, has referred to this general process as "the Western miracle" — that of providing an ever higher and higher standard of living for more and more Americans. The key element in this miracle has been more and more reliance on power-driven machines to get the day's work done.

In the nature of the extremely complicated apparatus involved, full development of systems which have passed through the "think stage" into the status of practical possibilities will be a time-consuming process. It will also be a very exacting process, calling for a tremendous application of engineering skill and ingenuity. However, the engineers who are concentrating on this difficult, workaday phase of the development of apparatus for automatic control will be inspired by the knowledge that they are making a crucial contribution to technical progress which holds great promise of good for the American people.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw

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In Behalf of Progress . . .

Long-Range Trends Challenge Food Manufacturers

With general business again pointing upward, now is a good time to take another long-range look. For ours is a dynamic economy, and management must keep raising sights.

Food manufacturers should gear future expenditures for expansion and research to such factors as projected consumer spending power, population growth, and changing product demands.

To point up the trends, McGraw-Hill's Economics Department has surveyed the prospects for growth in the economy. And it has come up with some useful targets for long-range planning.

By 1970, the gross national product is expected to increase from the 1953 level of $367 billion to $562 billion. This involves a population growth of 40 millions, but only 17 million more workers (compared to 1950).

Of the projected total national income in 1970, $420 billion represents consumer income after taxes; $24 billion, business income after taxes; $50 billion, expenditures for national defense and other government services; $68 billion, spending to replace worn out equipment and depleted resources.

The 1970 labor outlook includes 75.4 million workers who will spend only 35 hours a week on the job, and whose output per man-hour will be $4.15 (it was $2.82 in '53).

A key factor in this projection of economic growth is a potential increase in output per man hour of 2.5% per year (the 1930-50 average increase is 2%).

The anticipated trends present two obvious challenges to food manufacturers. One is to take advantage of the growing potential market for processed foods. The other is to improve factory operations enough to nearly double worker productivity.

With income per person (after taxes and in 1953 dollars) placed at $2,165, there is bound to be a great per capita demand for quality and convenience foods, as well as for more dietary variety. And as devotion to leisure increases, the market for pre-cooked meals even at a relatively high price, should become a substantial one.

It is not surprising, then, that the long-range study indicates an increase of 15% for manufactured foods and beverages between 1950 and 1960, and of 35% by 1970. And in our estimation, these figures are quite on the conservative side.

In any event the long-pull opportunity for food companies is a very bright one. And the challenge to management is most intriguing.

The pace-setters see and accept this challenge. The research director of one firm which spent better than 0.5% of net sales on research in 1953 sees the need to double research activities in the next few years.

The pace-setters also are spending millions for modernization and expansion each year.

Are your plans as well oriented to the future?

Prepare Yourself for Guaranteed-Wage Demands

Union leaders are applying new pressure for guaranteed wages. And because of the steady demand for food, our industry is considered well suited to annual-pay schemes.

The pitfalls of a guaranteed annual wage range all the way from bankruptcy to a labor voice in management. They even include the sidetracking of earnings from necessary research and modernization.

Therefore, the management of each food firm will be well advised to evaluate the guaranteed-pay plans in terms of their company's operations and financial structure.

Labor's first move may be to demand the guaranteed work week. Then after you get accustomed to this, a demand for a guaranteed annual wage will follow.

The CIO Packing House Workers union already has a guaranteed 36-hour week, and one cereal manufacturer assures each worker 140 hours' pay a month if he is called to work.

And at least three food companies have guaranteed annual wage plans. So precedents have been set upon which unions in our field can hang their arguments.

Outside our field, but indicative of the new drive by the unions, are the three guaranteed plans presented to the steel, electrical manufacturing, and automobile industries. The steel union, for example, wants each worker with three-year seniority to be assured of 60% of his weekly salary for a period of 52 weeks.

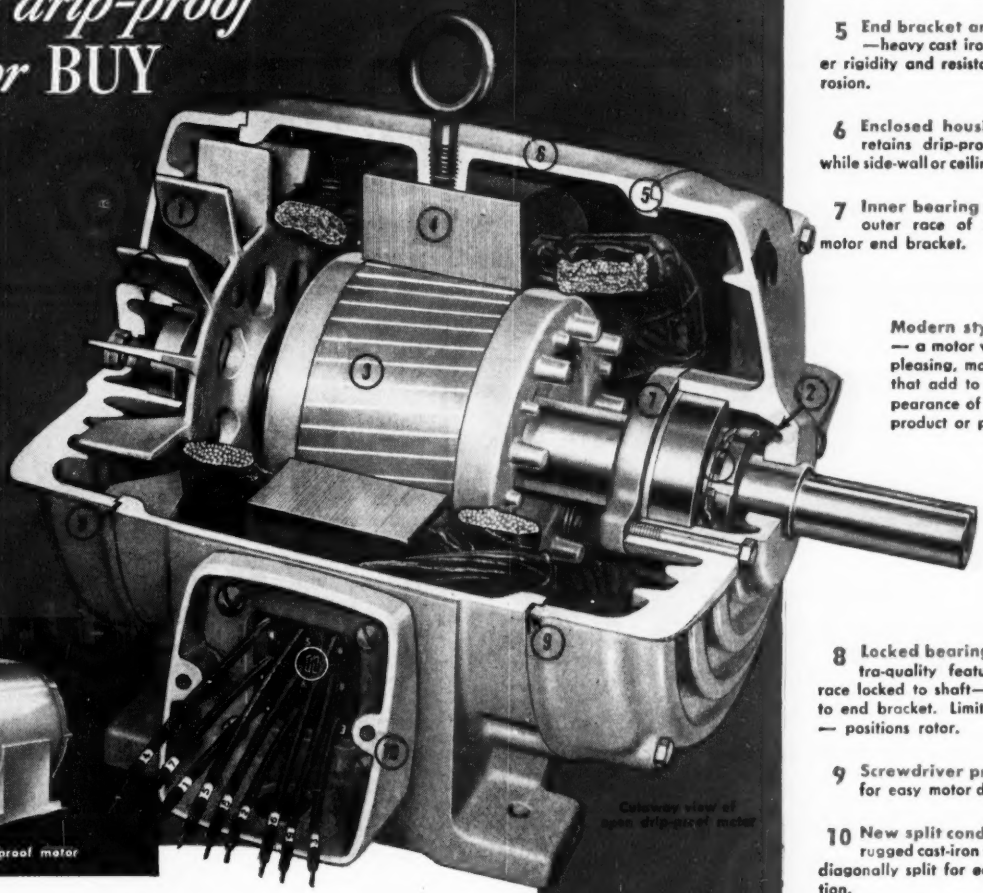
Union leaders will argue that their intent is to force industry to stabilize employment, not to obtain pay for no work—a very plausible argument and one likely to get public support.

So get prepared for a new labor headache. Meanwhile, look to your maintenance to prevent short-time layoffs. And study your seasonal business cycle to see how the employment peaks and valleys can be smoothed.

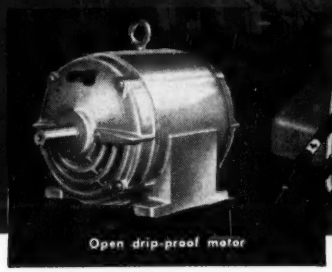
You may be able to make a wage guarantee meaningless. And in so doing, save your shirt.

Here's the inside story of the
NEW L.A. *Line*

...your BEST *open drip-proof motor* BUY



Cutaway view of open drip-proof motor



Open drip-proof motor

1 Fan — efficient, non-sparking fan. New aerodynamic design for more effective cooling.

2 Large grease chamber — factory lubricated for years of attention-free service.

3 Indestructible cast-aluminum rotor — dynamically balanced with fan for smooth, quiet operation.

4 Stator — prewound stator core utilizes Formvar wire insulated with a new Alkyd Asphalt Resin insulating varnish.

5 End bracket and housing —heavy cast iron for greater rigidity and resistance to corrosion.

6 Enclosed housing—motor retains drip-proof features while side-wall or ceiling mounted.

7 Inner bearing cap—locks outer race of bearing to motor end bracket.

Modern styling — a motor with pleasing, modern lines that add to the appearance of your product or plant.

8 Locked bearing — an extra-quality feature. Inner race locked to shaft—outer race to end bracket. Limits end play — positions rotor.

9 Screwdriver pry slots — for easy motor disassembly.

10 New split conduit box—rugged cast-iron conduit box diagonally split for easy connection.

11 Lead identification — permanent, positive lead identification spacer in conduit box plus lead tagging.

Here is the new L.A. open drip-proof motor. It's completely redesigned inside and out to meet new NEMA standards. You get the advantages of Louis Allis's 52 years of motor building experience.

This motor is better protected, more drip-proof . . . has new bearing construction and improved insulation. Learn about these and the many other features of the new L.A. Line. Call your nearby Louis Allis Sales Engineer for information on this and our complete motor line.

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SARCO

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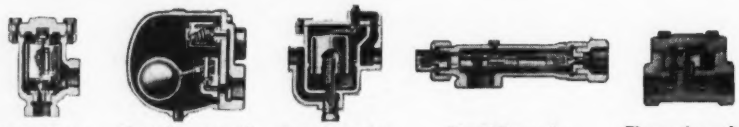
Here are a few

STEAM TRAPS



Thermostatic | Float-Thermostatic | Camlift Bucket | Liquid Expansion | Thermodynamic

The right trap for each job . . . Only Sarco offers 5 functionally different types — not variations of one type!

TEMPERATURE CONTROLLERS

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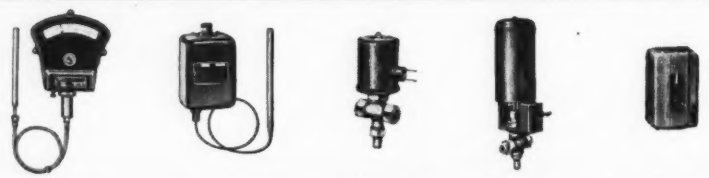
ELECTRIC-THERMOSTATS AND VALVES

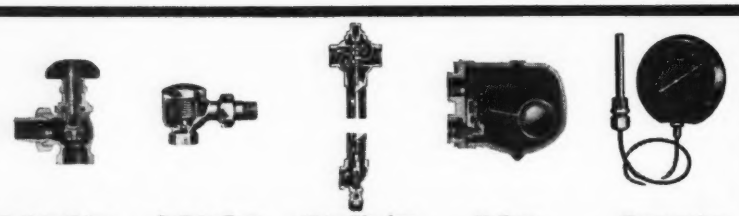


Indicating | Non-Indicating | Solenoid Valve | Motor Valve | Room Thermostat

AIR ELIMINATORS AND STRAINERS

Air Eliminators | Strainers | Scraper Strainers

OTHER HEATING SPECIALTIES



Radiator Valves | Radiator Traps | Water Blenders | Air Traps | Thermometers

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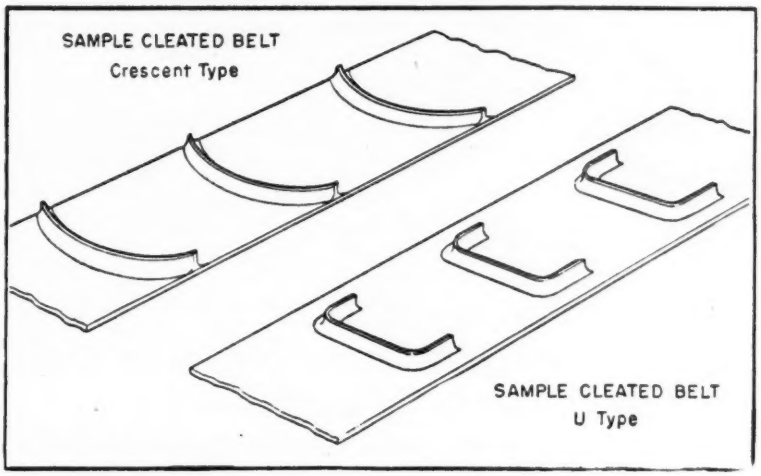
NEW EQUIPMENT & SUPPLIES



Cleated Belting Ups Sanitation

Improved plant sanitation, increased carrying capacity and elimination of spillage in the handling of powdered and granular materials is reported with use of new, cleated white-neoprene conveyor belting, recently announced.

In transit, normal vibration of carrier levels these materials on belt and eventually may result in side spillage. Crescent or U-shaped cleats retain material thereon. Further, cleats permit material to be successfully belt-conveyed on inclines.

Specifically developed for the food industry, the heavy white neoprene belting surface is odorless, tasteless and non-toxic. Belting consists of multiple layers of hard-woven light duck, molded together with neoprene rubber between the plies and over the entire surface. It is then finished with a 3/64 in. thick smooth cover on the carrying side and a friction surface on the pulley side.

Construction provides flexibility, high tensile strength and minimum stretch essential characteristics in operations where head and tail pulleys are small and on machines with limited take-up facilities. Belting is resistant to oil, grease, acids and alkalis. Smooth cover surface will not pick up or impart contamination flavors and odors from previous batches. Belting is available in cut-to-order widths up to 48 in. in 2 and 6 plies inclusive. Cleats are of various shapes, widths and heights.—*Globe Woven Belting Co., Inc., 1400 Clinton St., Buffalo, N. Y.*

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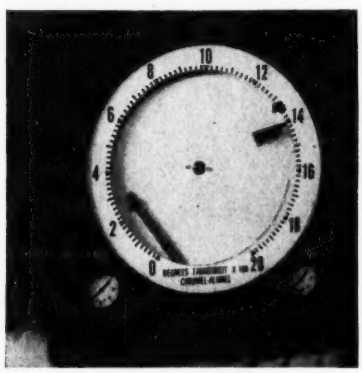

Process Instruments Have New Units

New measurement and circuity components are incorporated in a recently announced line of process instruments including potentiometric and a.c. bridge recorders and recording controllers. Instruments are designed for continuous measurement and control uninterrupted by periodic standardization. Foremost among new features are a magnetic standard in potentiometric system and a balancing unit in a.c. bridge system.

Both models are available with either electric or pneumatic control, and are equipped with a centerless pointer that simplifies chart changing and leaves practically all of chart exposed to view for easy reading.

Design of new line is reported to reduce maintenance and component replacement costs.

New magnetic standard, eliminates dry cells, slidewires, and many moving parts.

Heart of a.c. bridge system, new balancing unit supplies power to bridge and provides a means for rebalancing it. In cases where variable under measurement is temperature, circuit is unbalanced by changes in resistance bulb. Balancing is achieved by a servo motor which repositions balancing unit's rotor.

Other advantages of equipment include plug-in components, antibacklash gearing, internal illumination, and an integral pen-inkwell assembly designed for automatic realignment.

Reinforced steel case and die-cast aluminum cover are sealed with Neoprene gasketing against dirt and moisture, and can be furnished for either wall of flush mounting.

Chart speeds are 1, 4, 8, 12, and 24 hr., and 7 days.

Net weight of products varies from 75 to 95 lb. according to control form and measuring system. Units utilize a 120 v., 60-cycle power supply. Potentiometer has a power consumption of 65w., a.c. bridge, 40w.—*General Electric Co., Schenectady 5, N. Y.*

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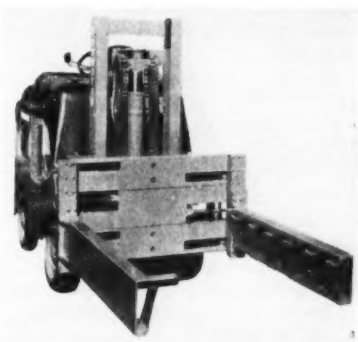

Spring Clamp Attachment Speeds Crate Handling

Fast, safe handling of numerous types of crated materials is reported with use of a new clamp attachment for fork trucks. Springs, mounted along the entire inner length of each arm,

contact crossmembers of crate. At points where they come in contact with vertical members, springs compress, preventing damage to crates or contents. Device assures safe, secure holding pressure.

Crate clamp is controlled by a special operating mechanism. Device permits other attachments to be interchanged quickly and easily. When required, entire clamp operating mechanism can be detached quickly, and replaced with standard forks.—*Tow-Motor Corp., 1226 E. 152nd St., Cleveland 10.*

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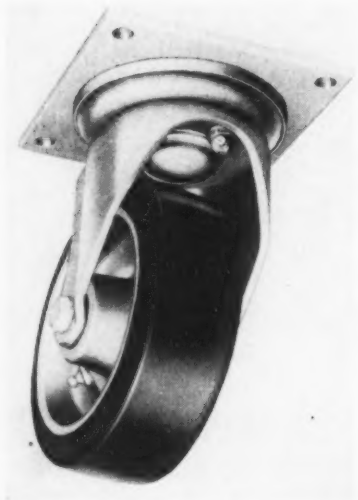

Improvements Minimize Caster Lubrication

Lubrication needs in the new "3D" Series "H99" casters have been minimized by the three following improvements:

A main swivel bearing baffle ring prevents entrance of dirt and water; a grease retainer prevents loss of swivel lubricant due to vertical drainage, and a wheel bearing seal effectively excludes foreign matter and retains lubricant.

Both swivel and wheel bearings are free of drag, maker states, since they have no preloaded frictional contact with moving parts. Seals are designed to permit flushing out of old lubricant, when required, by merely regreasing through use of standard pressure equipment without danger of seal blowout. Fully case-hardened raceways, extra-heavy king pin, double ball-bearing swivel help keep maintenance costs at a minimum and caster performance high.—*Bassick Co., Bridgeport 2, Conn.*

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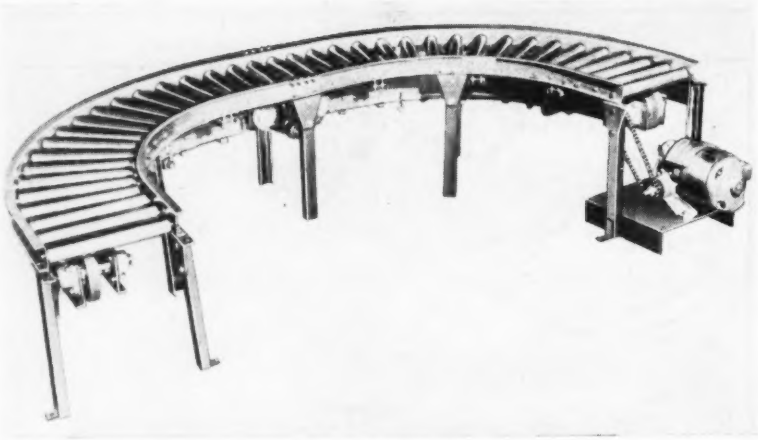

Live Roller Conveyor For 180 Deg. Travel

Packages can be readily and smoothly moved around a semicircle by use of a new 180 deg. power conveyor. It is available in 30, 45, 90 and 180 deg. of total power-driven horizontal travel.

Rollers of unit are actuated by contact with a bottom mounted flexible belt. Resulting live roller action transports packages around length of level curve. New power curve units cover widths over a broad range of sizes.—*Alvey Conveyor Manufacturing Co., 9301 Oliver Street Road, St. Louis 24.*

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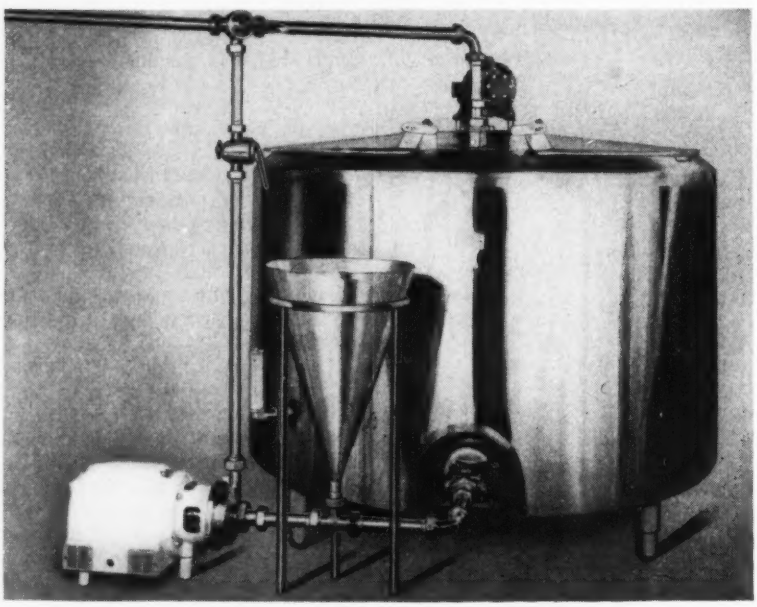

Equipment Assembly For Stable Ferment

Of interest to bakers is this complete line of equipment for use with the ADMI stable ferment process. Developed by the American Dry Milk Institute, this process eliminates the sponge operation in the making of bread and rolls.

Equipment includes stainless steel tanks for heating, cooling and mixing the ferment, sanitary pumps, tubing and fittings and ingrediators for dispersing dry materials with water. For bakeries wishing to prepare stable ferment in advance for use following day, maker also provides cylindrical storage tanks for cooling and holding the ferment.—*Creamery Package Mfg. Co., Chicago 7.*

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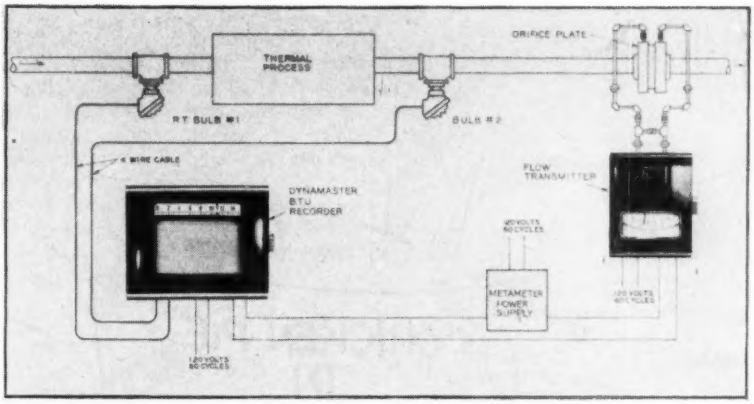

Measures and Records Rate-of-Heat Transfer

Fast, continuous measurement and control of rate-of-heat input or output is now possible through use of these new Dynamaster Btu. recorder-controller systems. They can be used to measure and record quantity of heat supplied to or drawn from process vessels, refrigerating plants, air conditioners, and a wide variety of other heat-exchanging devices. Control apparatus is available for regulating temperature or flow-rate of heat-transfer medium.

In the basic Btu. recording system, one Dynamaster measures temperature difference with two resistance thermometer bulbs and receives flow-rate from a flow transmitter. From the two variables, it then continuously computes and records the Btu. product.

Other systems are offered that provide for recording temperature difference along with Btu. on a single round or strip chart by a single two-pen instrument, recording of Btu. and either flow-rate or temperature difference by two separate instruments. In most instances, totalizers can also be furnished with the Btu. recorder to integrate the energy or heat-transfer.

Matched resistance bulbs are not required. An optional bulb trimming adjustment can be supplied, enabling user to install a replacement bulb, and match it to system by trimming bulb and lead wires with bulb trimming adjustment.—*Bristol Co., Waterbury 20, Conn.*

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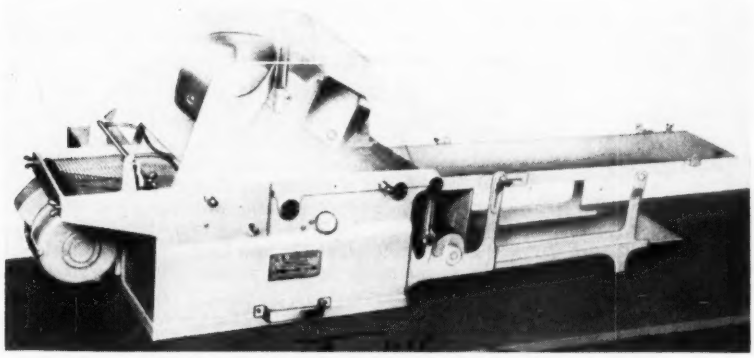

Portable Compact Coater Is Easy to Operate

Highly skilled operators are not needed to run this new Nielson chocolate and glaze coater, a compact portable unit.

Coater features a new bottoming device, adjustable blower unit, and a patented take-off device. The latter discharges coated pieces of candy or baked goods on pre-cut sheets of paper of pre-determined lengths. These same sheets may be re-used many times for further economies of operation.

Machine is equipped with variable speed drives and electrical heaters—all separately adjustable for production without starting delays, even in cool rooms, thus increasing daily output. It is electrically heated throughout by thermostats immersed in chocolate mass to provide automatic control. Quality of chocolate is protected by air chambers around heaters, minimizing losses from overheating or loss of temper. Blower unit has its separate motors and adjustable air intake for complete coat-thickness control.

Coater is available in two models—7 in. and 12 in. Former has a daily output of about 400 lb. of coated pieces, a chocolate capacity of 33 lb., and a variable conveyor speed of 40-80 in. per min. It is a table model and is easily portable. Latter model features a daily output of 800 lb. of coated pieces, a chocolate capacity of 55 lb., and a variable conveyor speed of 30-120 in. per min. This model is provided with castors for fast, easy movement. U. S. and Canadian distributor is—*Geveke & Co., 25 Broadway, New York City 4.*

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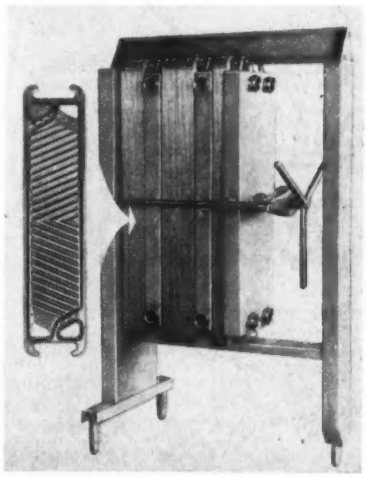

Zig-Zag Flow Marks New Heat Exchanger

Uniform, thorough and effective product heating and/or cooling is claimed for this Zig-Zag Flo plate heat exchanger.

Corrugated pattern keeps liquid in turmoil assuring maximum exposure to surface of plate. This feature assures non-adherence of liquid to plate. Equal distribution of liquid also eliminates any hot or cool spots on plate. Thus in processing milk, burn-on, partial pasteurization, and off-tastes are eliminated.

Plates are easily cleaned by circulation of cleaning solution, if desired, and by slight hand brushing, if necessary. Gasketing every other plate cuts

THE OBVIOUS *competitive advantages* of aluminum foil are at work for a growing number of aggressive frozen food processors. Here's what they get:

NEW PRODUCT ATTENTION—Gleaming aluminum foil packages are a standout in the refrigerated case, or on the shelf. They make products more desirable to customers because foil reflects the quality it protects.

NEW PRODUCT PROTECTION—Foil's extra product protection permits distribution over greater distances—thus helps you develop profitable new markets. Non-porous foil prevents dehydration. Reflects heat, light. Keeps moisture out indefinitely. Imparts no flavor. Prolongs shelf life.

NEW PRODUCTION VERSATILITY—Foil has excellent cold transfer characteristics for frozen foods. It is pliable and easy to handle. Easy to print on, color, coat, emboss, or combine with other materials. Economical and reliable heat seal easily applied.

WE DON'T MAKE PACKAGES, BUT . . .

There are many leading converters eager and qualified to tackle your packaging problem with you. These converters rely on Kaiser Aluminum as a major supplier because we are an integrated operation, producing foil of unsurpassed quality in a wide range of specifications. Our Engineering and Development Division is available to work closely with converters and with you.

For names of leading converters contact the Kaiser Aluminum sales offices listed in your telephone directory. Or write Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office*, Palmolive Bldg., Chicago 11, Ill.; *Executive Office*, Kaiser Bldg., Oakland 12, Calif.

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number of gasketed plates in half, as well as necessity of gaskets on terminal dividers and followers. Vulcanized bond holds gasket to flat surface of plate eliminating germ and bacteria breeding crevices caused by gasket grooves. Press is of sturdy stainless steel compact construction. Take-up screw does not create a hazard since it does not extend outside floor area of press.—*Kusel Dairy Equipment Co., Watertown, Wis.*

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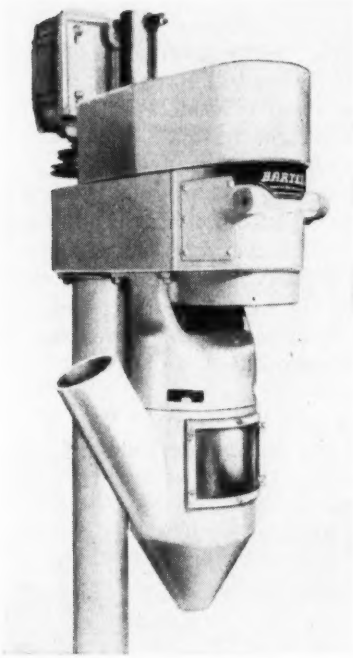

Flexibility a Feature of Precision Filler

Fast and accurate filling of liquids, powders and viscous materials is reported with use of new automatic machine. Unit will make up to 150 fills per min. holding tolerances to within ± 1 percent of exact fill.

Degree of accuracy of filler is attained by timing control which is achieved through electric brakes and control circuits.

Special features include: (1) Machine tool-type low-friction motor, with quick and positive action, no adjustment needed to clutch or brake. (2) Timing with a positive mechanical revolution control counter. (3) Spun stainless steel hopper with quick-release clamps for easy cleaning. (4) A complete range of feeder toolings, all easily interchangeable.—*Bartelt Engineering Co., Rockford, Ill.*

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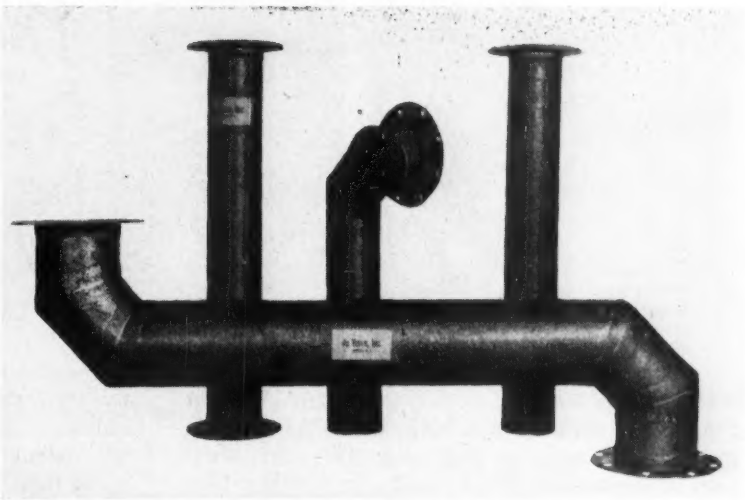

Ducts, Vent Pipes, Fittings Made of Fiber Glass

Dimensional accuracy and corrosion resistance are outstanding features claimed for a new line of vent pipes, ducts and fittings made of polyester bonded fiber glass.

Units are made of glass-fiber mats impregnated and bonded under pressure with resin to form a dense, homogeneous product. They can be made to any dimensions.

In bonding the material, multiple layers of fiber glass mat are placed in random directions. Under heat and pressure, these layers lose their separate identity and form a homogeneous product with greater non-corrosive properties, due to elimination of porosity. Ducting, elbows, tees and fittings are produced to accurate dimensions. This feature reduces installation time and costs because of speed and ease with which these prefabricated sections can be assembled in the field by inexperienced labor with simple tools.

Vent pipe is readily installed with standard connections, and its strength and lightness minimizes number of hangers required. Manufacturer is equipped to custom build installations to customers' specifications. — *Du Verre, Inc., P. O. Box 97, Hamburg, N. Y.*

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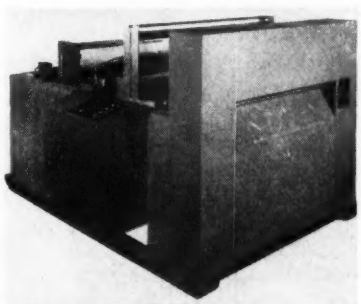


Produces Large Size "Poly" Drum Liners

Of interest to processors requiring exceptionally large polyethylene bags is a new automatic machine. It produces drum liners up to 46 x 65 in. or longer by means of a built-in skipping attachment. Bags of smaller sizes for fruit and product packaging and other purposes may also be produced from either flat or gusseted polyethylene tubing, as is preferred.

A clean, sharp heat-seal is made by controlling temperature, pressure, and dwell-time of both heating and cooling cycles. Material is held under pressure during both heating and cooling cycles, thus avoiding strain on polyethylene, which would cause distortion at seal. The cut-off mechanism employs razor blades to provide a clean, sharp edge.

Bags such as those used for packaging of fruit and vegetables may be produced automatically with a bottom which squares up, and with heat seals in sides. This removes weight load from the seal, and provides a squared-up bottom for better stacking and handling. These bags are produced two at a time from gusseted tubing.

Speed of production depends upon bag sizes and film gages used.—*Packaging Industries, 50 Church St., Montclair, N. J.*

Circle 171C on Reader Service Card

Progress IS FROZEN BY Waldin Smugg

BEHIND HIS WALL of self-satisfaction, Waldin Smugg sits encased in Ice-Age ideas. As a foodle processor, he assumes that all foodle progress occurs in foodle plants. So he waits for refrigeration news to appear in the foodle papers. Never reads about *other* food plants. So some competitive foodle plant has to install a new refrigeration idea before Smugg ever hears about it.

And yet, refrigeration is one of the most industry-wide of all food-plant operations! Quick-freezing . . . cooling . . . cold storage . . . air conditioning . . . all are common throughout the food industry. And only one kind of food-plant magazine can deliver all the big refrigeration developments—*wherever* they occur—to each kind of food plant, *whatever* the product.

Here is a primary reason why FOOD ENGINEERING exists—why it has more subscribers than any other food-plant publication. FE helps break down the artificial "walls" between branches of the food industry—brings its readers in *one* kind of plant the useful ideas from *others*. If Waldin Smugg knew this, he'd be right on top of the fast refrigeration developments* and many others.

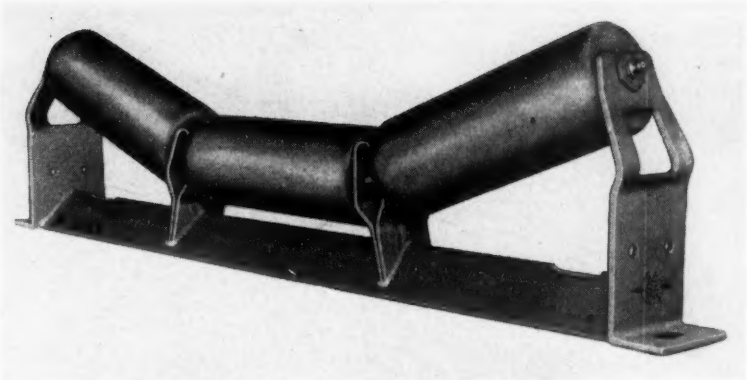
Of course, that's not the *only* reason FE is consistently voted tops in food plants. Another is that FE *specializes* in plant operation and management. FE also has the biggest, most engineering-minded staff. And, using the unmatched facilities of McGraw-Hill, FE searches *all* industries for ideas food plants can use.

★ ★ ★

So, actually, the only thing Smugg's attitude freezes is progress. The quickest way to thaw it out is FOOD ENGINEERING. If you happen to see Waldin Smugg, tell him about FE. If you see him in your mirror . . .

LOOK OVER YOUR WALL WITH **FOOD ENGINEERING**

* . . . and here's a graph that shows how the "tidal wave of engineering" has swept new refrigeration ideas from one kind of food plant to another. This is just one example of the kind of developments FOOD ENGINEERING is uniquely-equipped to report to you—*every month.*



Conveyor Belt Carrier Improved Many Ways

Numerous design features are claimed for this economical belt conveyor carrier.

Rollers, 4 in. dia., have spun ends and turn on precision ball bearings. Die-cast labyrinth seals protect bearings and provide permanent protection since they are non-corrosive. Alemite fittings are provided for relubrication if desired. However, sufficient grease is contained in bearing chamber to operate carrier rolls on a "lubricated for life" basis.

Carrier frames are of jig-welded steel construction. Formed steel brackets and inverted angle base are designed to prevent build-up of dust and dirt. Carrier rolls are interchangeable and can be inserted or removed from brackets without tools. An extended lubrication kit is available.

The new SP-745 carrier is available from stock equipment in sizes for 18, 24, 30 and 36 in. belts.—*Standard Products Div., Stephens-Adamson Mfg. Co., Aurora, Ill.*

Circle 173A on Reader Service Card

Worm Reducer Assembly For Light Tasks

Now available as standard equipment is a powerful worm reducer assembly for use with infinitely variable speed transmissions in ½ and ¾ hp. sizes.

New reducer can be furnished with double output shaft extension, single shaft extension, horizontal or vertical. Several worm ratios are available including 5:1, 12:1, 23:1, 45:1, and 60:1 providing a range of speeds from 550 rpm. to zero down to 10 rpm. to zero.

Worm gear is of phosphor bronze. Worm is alloy steel hardened and ground. Oversize ball bearings support worm and gear shafts and are designed to take heavy thrust and overhung loads. Ball bearings replace sleeve bearings used in reducer that this new unit replaces. Spring-loaded oil seals replace felt seals used on earlier model and center distance between shafts is increased 60%. These new features provide greater efficiency over earlier model, an increase of over 15% in high ratios.

Entire compact assembly of reducer, variable speed transmission and motor is mounted with only four bolts, reducing installation costs.

Speeds from any desired maximum to zero are available at turn of handwheel. Micrometer type control is standard with transmission and makes it possible to accurately reset to a predetermined speed. Other features of transmission include built-in overload protection, "straight line" speed adjustment with equal changes in speed for equal changes in the dial setting, wide choice of built-in motors including explosionproof and many types of controls including remote electrical, pneumatic and hydraulic.—*Graham Transmissions, Inc., Menomonee Falls, Wisc.*

Circle 173B on Reader Service Card

Chemical Analyses Eased With Pushbutton Unit

Complex chemical analyses via push-button is now a reality with the aid of a new automatic instrument. Named the Multi-Component Infrared Analyzer, it automatically analyses up to ten components in a sample in 10 min. Results are presented instantly on an electric typewriter, a counter, or punch-card device.

Instrument time is shortened by nearly 50% over usual manual spectrometer analyses and chances for human error are greatly reduced. Instrument was developed in conjunction Ethyl Corp. and will be installed in their laboratories at Baton Rouge, La.

Unit is applicable wherever there is a need for conducting large numbers of routine analyses of more than one component in a mixture. Since analytical data is presented in a form ready for automatic computing, operator has little to do except push button.

Instrument consists of a standard single beam infrared spectrometer. It is attached to a control unit which sequences through ten predetermined analytical wavelengths. These selected wavelengths depend upon components to be analyzed. The sample cell is automatically shifted into and out of the infrared beam, to give quantitative readings.

Time required to cycle through ten points is 10 min. Photometric accuracy in the 15 to 35% transmission range is plus or minus .001 absorbancy units. Quantitative analyses have been made with an average error of less than 0.1% absolute and a relative error of less than 0.2 percent of the amount present.

Sequence of operating steps on analyzer is as follows: (1) Operator selects ten analytical wavelengths and ten corresponding slit widths by means of 20 multi-turn potentiometers mounted on master control panel.

HAD YOUR PHOSPHATES LATELY?

Of course you have! Take your morning toast or luncheon rolls, for example. Chances are they were made from flour enriched with calcium phosphate, with yeast cultivated with ammonium phosphate and with salt kept free-flowing by a trace of tricalcium phosphate. What's more, phosphates were in your sugar, condensed milk, process cheese and a score of other food favorites, including your soft drink.

If you manufacture or process food, you're probably familiar with the versatility of phosphates. Also, you're probably aware of Victor's outstanding leadership in phosphates. Victor's plant facilities, research staff and sales service organization are yours to use. The next time you have a product or process problem that a phosphate might solve, call on us. You'll find that *it pays* to see Victor.

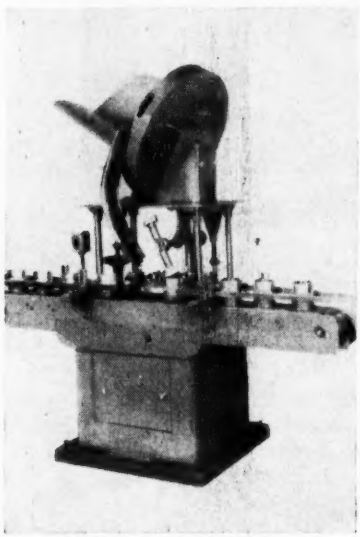
VICTOR SERVES THE FOOD INDUSTRY

AMMONIUM PHOSPHATES—Manufacture of yeast, vinegar, yeast foods, pH control of soda crackers, bread improvers . . . CALCIUM PHOSPHATES—Mineral enrichment, leavening agents for self-rising flour, self-rising corn meal, pancake flour and prepared mixes; baking powder. To prevent caking of salt, soda, and sugar . . . IRON PHOSPHATES—Iron enrichment . . . PHOSPHORIC ACID—Manufacture of yeast, sugar, soft drinks, imitation jellies, gelatin . . . SODIUM ACID PYROPHOSPHATE—Baking acid in prepared mixes, doughnut flours, ingredient in baking powders.

VICTOR CHEMICAL WORKS, 141 WEST JACKSON BLVD., CHICAGO 4, ILL.

Selected wavelengths are then sequenced by programming control unit. (2) Instrument sets on first wavelength and slit width. (3) With cell out of optical path, signal is allowed to reach equilibrium and transmittance value is read out. (4) Control unit triggers cell in-cell out mechanism and sample moves into beam. Signal is allowed to reach equilibrium and transmittance value (I) is read out. (5) Instrument advances to next wavelength and slit setting and steps are repeated until up to ten analytical wavelengths have been read. For calibration purposes, wavelength-indexing and zero-setting check points may be selected by means of push buttons at end of automatic cycle.—*Perkin-Elmer Corp., Norwalk, Conn.*

Circle 173C on Reader Service Card



Non-Stop Lid Sealer Minimizes Spillage

All types of metal seals, including inner seals, plugs and friction lids can be automatically applied, to both metal and fiber cans of various shapes with this sealer.

Application of seal or lid is performed while can is in continuous motion, no momentary stopping or holding being required. This eliminates danger of splashing or spilling and results in greater output.

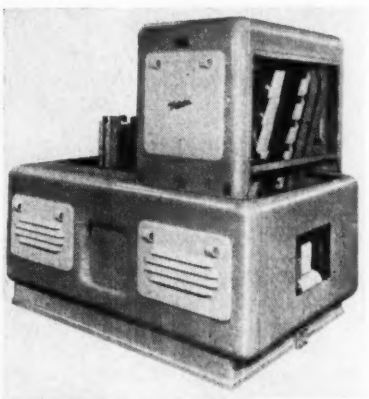
Sealer is equipped with a specially designed hopper that automatically feeds lids or seals into a chute. A rotating head equipped with magnetic fingers picks up a seal from bottom of chute and applies it to opening in can as it moves into position under rotating head. No supplemental operation is necessary as application of seal is positive.

Rotating head and magnetic fingers are fully adjustable, so that lids may be applied to an opening in any position on top of can. These adjustments include compensation for variations in cans.

Bottom of chute is equipped with a special escapement device which permits only one seal at a time to be withdrawn, regardless of size or weight of individual lid.

When seals are to be rolled in under neck of spout, as on olive oil cans, a special spinning head can be furnished.—*Tite-Cap-Machine Co., Inc., 76 Rose St., New York City, 38.*

Circle 175A on Reader Service Card



Package Former Requires Minimum Attendance

The only attendance required at this high speed package forming machine is to check the supply of blanks. Unit automatically converts blanks into perfectly shaped glued cartons or trays at speeds of 175 or more per min. Machine also operates efficiently at lower speeds of 50, 75, 100.

Former is adjustable and convertible to set up a wide range of top-opening, hinged cartons or trays, suitable for many food products such as crackers, cookies, baked goods, tomatoes, fruit.

It handles carton blanks in sizes from 6 in. to 18 in. long, and 9¼ in. to 22 in. wide. Larger or smaller blanks may also be accomodated. Blanks are the low cost type, easy to store and handle. They are automatically fed from magazines and glue applied to end flaps. As they are held firmly in position by V-lock clamps, while they rotate through glue-setting cycle. This interval is long enough to permit glue to set firmly.

V-lock prevent cartons from slipping, sliding or shifting during cycle. Thus cartons come out squared and formed, to avoid overwrapping problems, and to make finished package look its best.

Unit requires only a small floor area, measuring 5 by 6 ft. It is of rugged construction, built to give years of continuous, trouble-free service. Its operation requires only two cams. Blank feeding mechanism requires no vacuum. One ¾ hp. drive motor runs the machine. Mechanism is easily accessible for cleaning or adjustments. —*Peters Machinery Co., 4700 Ravenswood Ave., Chicago 40.*

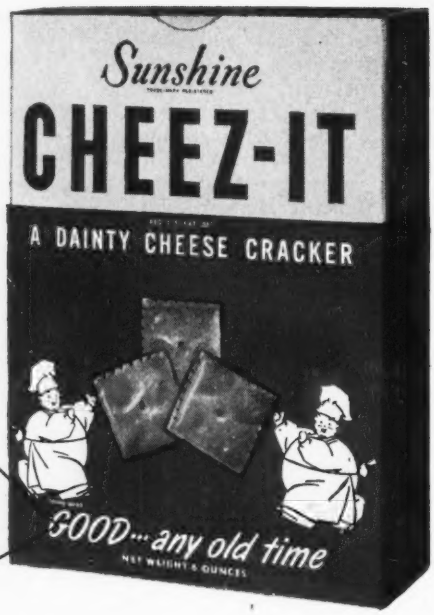
Circle 175B on Reader Service Card

Flour in Bulk "Alabama Bound"

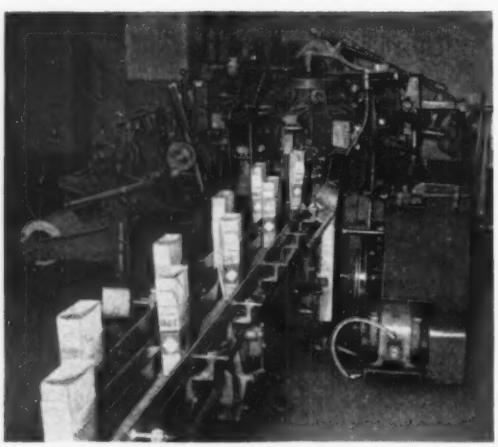
Delivery of flour in bulk trailers from mill to bakery is now in operation in Alabama. Unit shown above is now making daily trips between Decatur, Ala., and Purity Bakery Co., Nashville, Tenn. Savings of 11¢ per bag are claimed.—*Fruehauf Trailer Co., Detroit 32.*

Circle 175C on Reader Service Card

GOOD . . . any old time –



that goes double because they're PACKAGED BY PNEUMATIC!



View of Medium Double Package Maker in production of CHEEZ-IT containers at Sunshine plant in Long Island City. Pneumatic machines in adjoining line handle two sizes of Hi Ho cracker packages.

On the CHEEZ-IT package there's a line "Good — any old time." That could mean good anywhere, for any occasion. That's quite true. You could say it again and mean that tasty CHEEZ-IT crackers always keep fresh in the package!

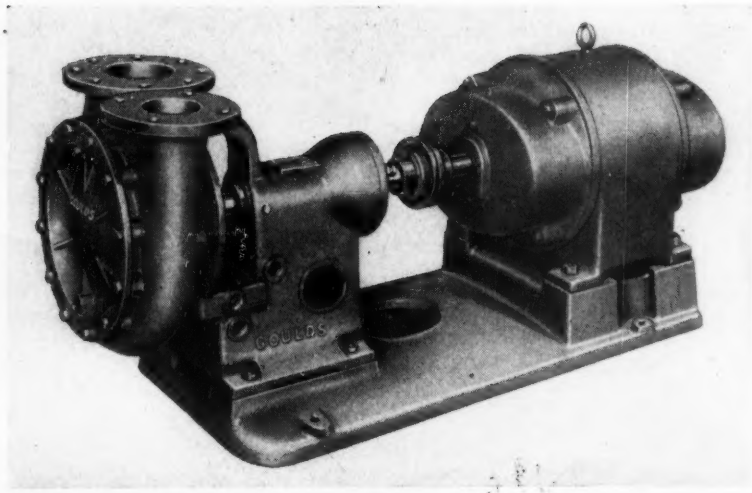
That's true, too — chiefly because CHEEZ-IT crackers are packaged on Double Package Maker equipment designed and built by Pneumatic. These machines produce the famous package within a package — *double* protection — so that CHEEZ-IT crackers lose none of their original just-baked crispness before they're ready to use.

That's worth a great deal to any company competing for the consumer's continuing favor with a perishable product. Leading producers of packaged goods find the lasting, "lower cost per container" efficiency of Pneumatic equipment equally valuable in keeping production costs down to levels that permit profits. They depend on Pneumatic. So can you.

* * * *

PNEUMATIC SCALE CORPORATION, LTD., 91 Newport Ave., Quincy 71, Mass. Also: *New York; Chicago; San Francisco; Los Angeles; Seattle; Leeds, England. Canadian Division: Delamere & Williams Company, Ltd., Toronto.*

PNEUMATIC ***Packaging and Bottling Equipment***



Improved Centrifugal Pump for Handling Corrosives

Numerous improvements over earlier similar models are reported for a new line of centrifugal pumps designed especially for handling corrosive liquids and slurries. Designated as the Fig. 3715 series, they are available with entire fluid end in 316, Gould-A-Loy 20, or 304 stainless steels, all iron, all bronze, bronze fitted, all iron with stainless trim.

Pumps are of support-head construction, with support cast integral with bearing housing. Maximum liquid temperature limitation for operation of pump has been raised to 350 deg. F. with provisions for water cooling of support head and quenching of gland.

Single or double mechanical seals can be provided, if desired. Stuffing box is on suction side of impeller, extending packing life, and minimizing leakage. Wide openings in support head provide easy access to stuffing box and gland.

Suction and discharge connections are in casing, and, by removing cover, interior of pump can be inspected and cleaned, or impeller can be removed and replaced, without disturbing piping. Casing is bolted to support head, and is permanently aligned by means of a lock fit. Standard position of suction and discharge openings is vertical, but casing can be swiveled 90 deg. either way, to provide horizontal suction and discharge openings on either side.

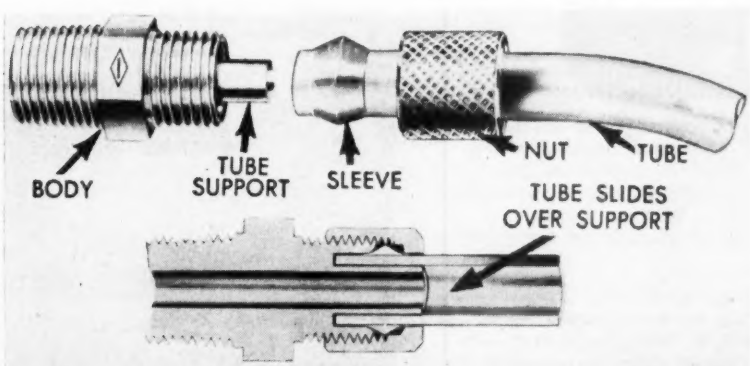
Impeller is of semi-open type, and is statically and hydraulically balanced. Clearance between impeller vanes and casing can be easily adjusted by simple external means, with no dismantling required.

Standard bearings are grease lubricated, and grease relief is provided to prevent over-lubrication. Bearing housings are completely sealed to exclude dirt and moisture, making pump suitable for installation outdoors, or where units are hosed down.

Pump is built in nine sizes, ranging from ¾ to 3 in. providing capacities up to 720 gpm., heads to 200 ft.

Particular attention has been given to standardization of interchangeable parts, making it possible for users of pumps to keep spare parts inventories at a minimum.—*Goulds Pumps, Inc., Seneca Falls, N. Y.*

Circle 177A on Reader Service Card



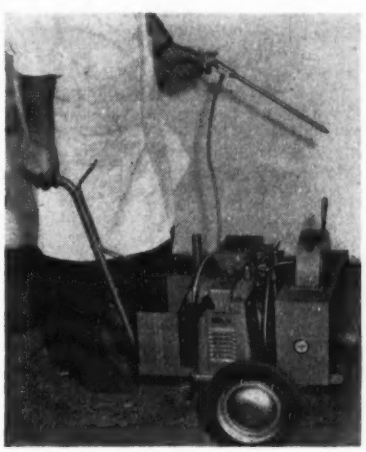
Tube Fittings Are Easily Installed

Installation costs are minimized with use of these new tube fittings—no tools are required to tighten them. Finger tightening provides leakproof joints and prevents over-tightening, manufacturer claims. Fittings withstand vibration and major tube movement, and can be re-used.

Line comprises 16 different types of fitting and each is supplied in several sizes. Unions, elbows, tees, and quick-disconnect shut-off valve connectors, and unions to go from plastic to metal tubing are included.

Elbows and tees are made from SAE 88 brass forgings. Connectors, unions, and nuts are made from fully stress-relieved bar stock; sleeves are Polyethylene. — *Dekoron Products Samuel Moore & Co., Mantua, Ohio.*

Circle 177B on Reader Service Card

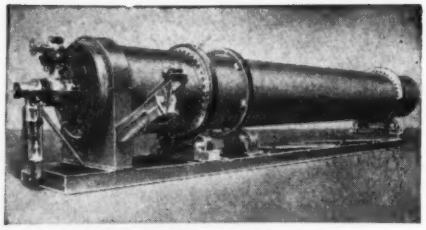


Hand Spray Gun Ups Vaporizer's Utility

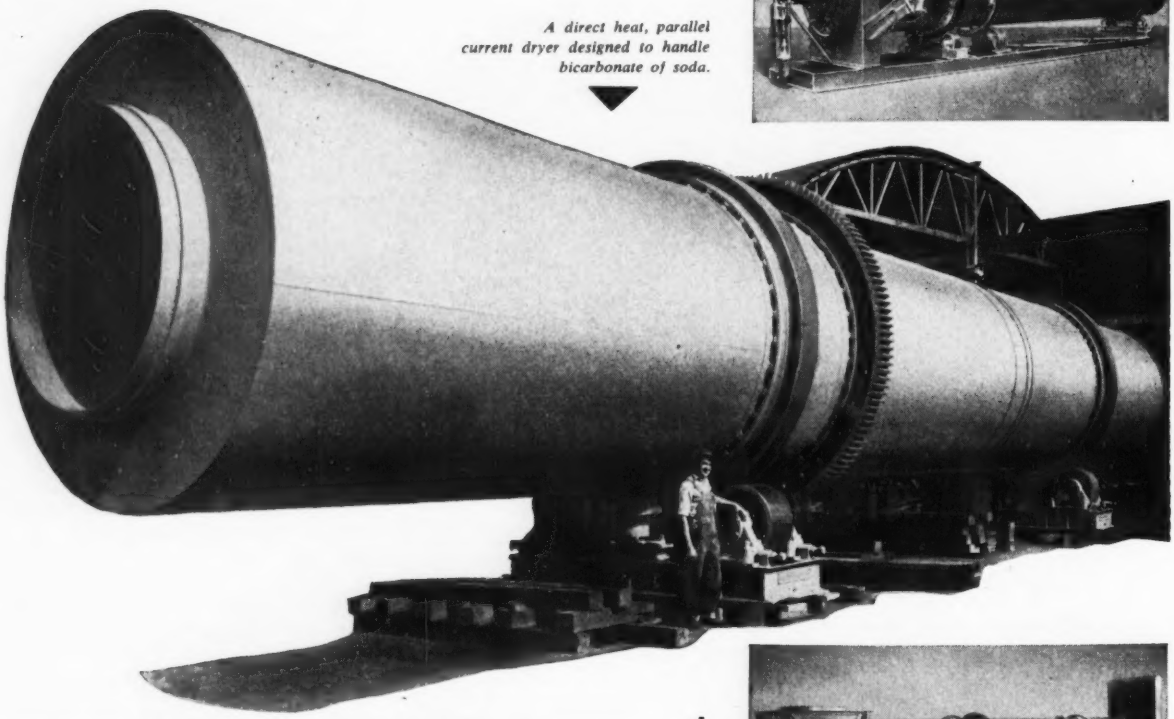
Addition of a new hand spray gun has made the Mistorizer adaptable to many types of insect control operations. Gun provides residual, contact, or localized spraying in critical or inaccessible areas.

Assembly now consists of three ma-

Steam tube dryer. Enables continuous operation at uniform temperature, producing an extremely uniform product.



A direct heat, parallel current dryer designed to handle bicarbonate of soda.

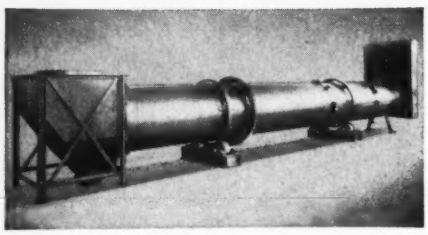


"LOW OPERATING COST" WITH

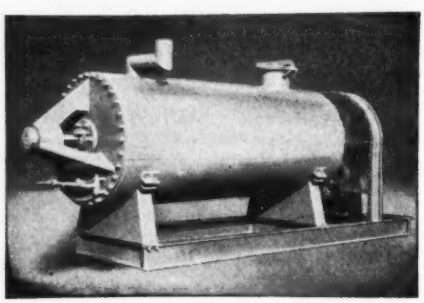
STANDARD HERSEY DRYERS

Presque Isle Starch Company of Maine reports potato starch drying production doubled... Huron Milling Company of Michigan reports one STANDARD-HERSEY dryer replaces 16 pairs of hot rolls... Stansbury Salt Company of Utah reports high efficiency at very low operating cost... Warriner Products Company of Louisiana reports *very satisfactory* operation in dehydrating sweet potatoes.

Hundreds of similar comments add up to one thing—STANDARD-HERSEY dryers are cutting costs and increasing production in many phases of the food field. We have, or can find, a solution to *your* drying problem. More than 30 different types of STANDARD-HERSEY dryers are available. Over 4,000 dryers have been built for hundreds of product applications. Investigate STANDARD-HERSEY for the answer to your drying problems.



Intermediate feed type starch dryer. Dries product from 40% to 18% with hourly output of 1,500 lbs. Extra high thermal efficiency because of no boiler loss.



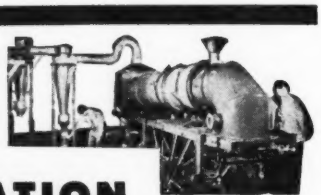
Steam jacketed batch type. May be used as either a dryer or cooker—operated under pressure or vacuum. Available with alloy or stainless interior.

SEND FOR FREE 12-PAGE ILLUSTRATED BULLETIN

Learn how STANDARD-HERSEY has aided manufacturers throughout the world in solving their dryer problems.

COMPLETE PILOT PLANT TAKES GUESSWORK OUT OF DRYING

STANDARD-HERSEY'S pilot dryers play an important part in solving your drying problems *before* blueprint stage.



THE STANDARD FOR 52 YEARS

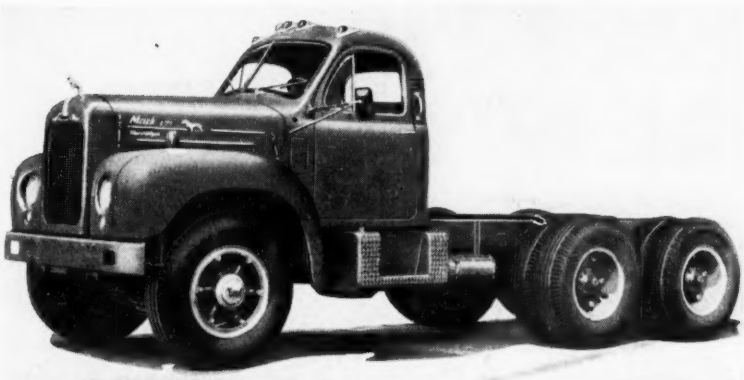
STANDARD STEEL CORPORATION

5045 Boyle Ave., Los Angeles • 7 East 42nd St., N. Y. 45

jor components: A 1½ hp. compressor unit, a 3 gal. insecticide tank, and new pressure-feed-type hand spray gun. Unit is completely portable; it is mounted on a heavy, two-wheel cart.

For vaporizing operations, machine's two-nozzle head converts insecticide into a dry mist of insect-killing droplets that will not wet or condense on equipment with which they come in contact. An automatic 1 hr. timer permits unattended vaporizing operations. One filling of machine with insecticide will fog 400,000 cu. ft. of space to control flying insects, or half this space to control crawling insects. —*West Disinfecting Co.*, 42-16 *West St., Long Island City* 1, N. Y.

Circle 177C on Reader Service Card



New Tractors Have High Power-to-Weight Ratios

High power-to-weight ratios are claimed for four new tractors added to round out the "B" line.

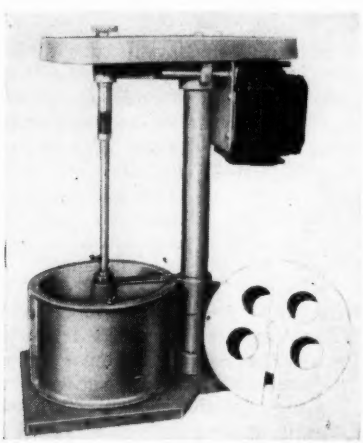
Designated as Models B-70T, B-70ST, (illustrated) B-71T and B-71ST, the tractors are four- and six-wheelers, gasoline and diesel-powered. Four-wheel models are rated from 50,000 to 63,000 GCW, depending upon trailer axle combinations, while six-wheel versions carry a 76,800 GCW rating.

Maker's largest Thermodyne gasoline engine, the EN707B,, a 707 cu. in. unit which delivers 206 hp. at 2,100 rpm., powers the B-70T and B-70ST. Maximum torque output of this engine is 560 ft. lb. at 1,100 rpm. B-71 Series tractors offer a 743 cu. in. diesel engine delivering 200 hp. at 2,100 rpm. and 537 ft. lb. maximum torque at 1,200 rpm.

A wide range of transmission options are offered to fit these engines most effectively to individual requirements. These include both 5- and 10-speed, two-lever duplex types with the additional option of a 3-speed auxiliary available in combination with a 5-speed main box on the six-wheelers.

All models feature the recently developed Vibrasorb clutch which effectively protects driving parts from destructive vibration.—*Mack Trucks Inc.*, 350 *Fifth Ave., New York City* 1.

Circle 179A on Reader Service Card



Portable Speedy Slicer Is Easy to Clean

Potatoes, pickles, cucumbers, beets, as well as luncheon meats and cheeses can be speedily sliced to thicknesses from 1/64 to ⅜ in. by this new machine. Several models will be available with interchangeable parts depending upon specific class of product to be sliced.

Slicer is portable and needs no installation. It can be placed on a table, movable stand or conveyor. Unit is easy to clean and can be completely dismantled within a two minute time period.

Dimensions: Height 28½, width

HERE'S WHY LEADING MANUFACTURERS SPECIFY CAMBRIDGE INDUSTRIAL WIRE CLOTH

IN BULK

20 x 250 mesh up to 4" openings—any metal or alloy

QUALITY—accurate mesh count and uniform mesh size are assured because we assign individual operators to each of our looms during weaving . . . careful inspection just before shipment eliminates defective material.

DELIVERY—you can get immediate delivery on the most frequently used types of cloth because we keep them in stock in our warehouse. If the type you need is not in stock, we'll schedule our looms to get your material to you without delay.

SERVICE—your order, no matter how small or large, receives prompt handling from our home office staff. Of course, your Cambridge Field Engineer is fully qualified to help you select the cloth to meet your specific needs.

OR FABRICATED PARTS

We're fully equipped to fabricate wire cloth parts of any type . . . filter leaves, strainers, sizing screens, etc. Single or quantity orders receive the same careful attention. We'll work from your prints or draw up prints for your OK.

LET US QUOTE on your next order for wire cloth, in bulk or as specially fabricated parts. Write direct or look under "Wire Cloth" in your classified 'phone book for the Cambridge man nearest you. And, if you buy Wire Cloth regularly, we'll be glad to send you our list of material available in warehouse stocks.

FREE CATALOG gives full range of wire cloth available from Cambridge. Includes fabrication facilities and useful metallurgical data. Write for your copy today.

The Cambridge Wire Cloth Co.

Dept. Q • Cambridge 9, Md.

WIRE CLOTH | METAL CONVEYOR BELTS | SPECIAL METAL FABRICATIONS

OFFICES IN LEADING INDUSTRIAL AREAS

Here you have a complete packaging plant in one compact machine. The savings it makes are impressive. And any product packaged by a TRANSWRAP machine is hermetically sealed, giving it utmost protection, longer shelf life.

The product may be solid, granular, powder, liquid or semi-liquid in form. It is simply fed into the hopper – the machine does the rest... Measures the prescribed quantity, forms the package from material in roll form, fills and seals it.

A Transwrap package is ideal for foods, candy, drugs, produce, coffee, chemicals, cleaning compounds, etc. in standard sizes or individual portions. Also for giving greater protection to products in cartons. Production speeds range from 45 to 150 packages a minute.

Let us show you how Transwrap packaging would benefit your product and lower your costs.

Write for literature on Transwrap machines

TRANSWRAP

DIVISION OF

PACKAGE MACHINERY COMPANY
SPRINGFIELD, MASSACHUSETTS

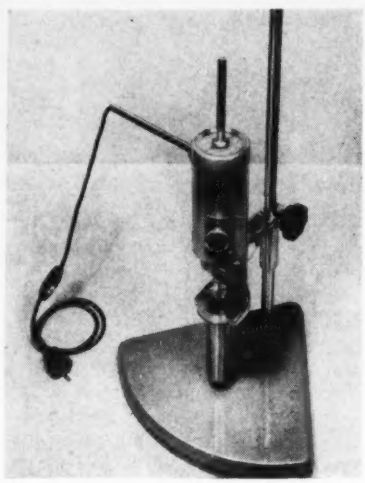
NEW YORK PHILADELPHIA BOSTON CLEVELAND CHICAGO ATLANTA DALLAS
DENVER LOS ANGELES SAN FRANCISCO SEATTLE TORONTO MEXICO, D.F.

Equipment & Supplies

13; length 22½ in. Total weight is approximately 50 lb. There are no parts that require oiling. Motor is of oil-free type. Thus, possible contamination of food by negligence of operator and also "freeze-ups" where brine and vinegar are used are eliminated.

Practically all parts in contact with food are made of Ni-Resist (Type 2) a copper free, high-nickel alloy cast iron widely used for its corrosion and wear resistance. Shaft and cylindrical bowl are made of chromium-nickel (18-8) stainless steel. Knives are of heavy gage cutlery steel. Base, top and supports are of aluminum alloys.—*Edfin Packaging Machinery Corp., 306 E. 123rd St., New York City 35.*

Circle 1798 on Reader Service Card



Quickly Senses Changes In Product Viscosity

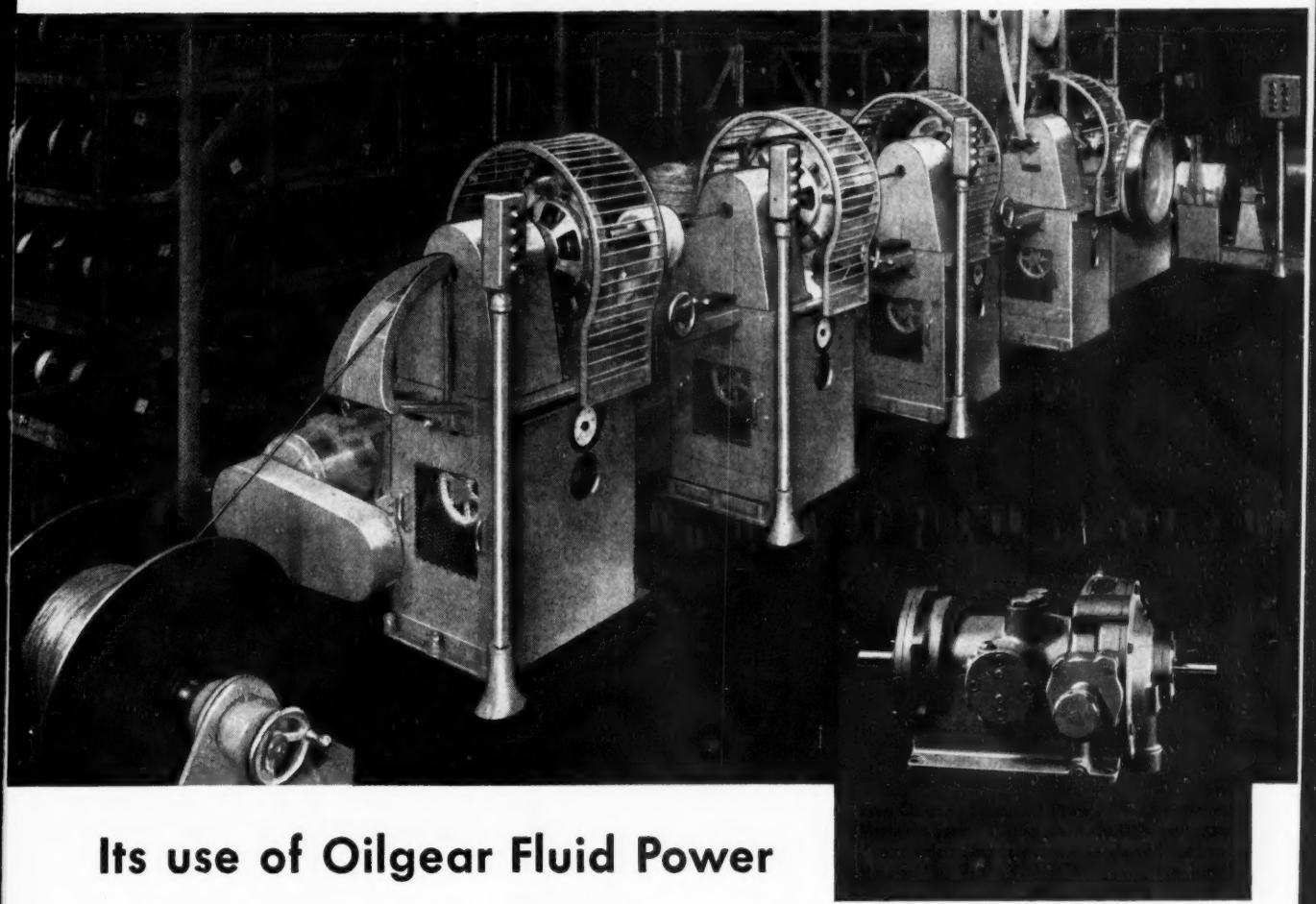
Rapid and accurate detection of changes in product viscosity is claimed with use of this new instrument.

Outstanding features of the torsional viscometer are: Frictional forces, linearly related to viscosity, are transmitted through a rotating measuring element to a rotatable mounted motor, the torque of which is opposed by a precision constant-modulus hairspring. A pointer, attached to motor casing, directly indicates viscosity while in operation. This feature makes possible a fast, accurate method of detecting alterations in chemical and physical properties of substances.

Instrument has three speeds, 20, 64 and 200 rpm. A gear box is incorporated for this purpose; its design is such that measurements are entirely unaffected by friction in gearing.

Changes of viscosity are indicated instantly, making unit acceptable for

MACHINE DESIGN AT WESTERN ELECTRIC



Its use of Oilgear Fluid Power

Western Electric Company, manufacturing unit of the Bell Telephone System, originates, designs and builds many of the special machines it uses in its own manufacturing processes. It also maintains unceasing pressure to improve upon machines already in operation, for optimum performance, for better product, for lower costs, for freedom from trouble.

Its use of Oilgear Fluid Power Drives and Transmissions has been increasing because, in the words of their engineers, Oilgear enables them among other things to synchronize many machine components easily and economically. A good example of all these points is the "short haul" video cable wrapping machine pictured above.

This machine was designed and built by the company's own men some years ago. For optimum performance, the speed of the heads should be easily and independently variable and the direction of rotation instantly changeable because the lay and pitch of the wrappings must be varied according to the requirements of the run. Moreover, the inside contour of the tube formed by the wrapping should be smooth and uniform so as to avoid setting up echo waves that interfere with transmission and vitiate signal strength.

Because of these requirements, a new drive was installed something over 4 years ago. A line shaft drives five Oilgear Fluid Power Transmissions, one at each machine head and the capstan.

The results were these: uniformity and control of tension are so good, the machine runs at 4 times its former machine speed; it is easy to vary speed and direction of rotation of each individual head; eccentric heads gave way to concentric heads, and supply spools are now loaded to full capacity instead of ¼th to ⅛th as before; the machine is stopped less frequently for loading. Maintenance on the former drive was involved and frequent—on the Oilgear equipment it has been simple and negligible.

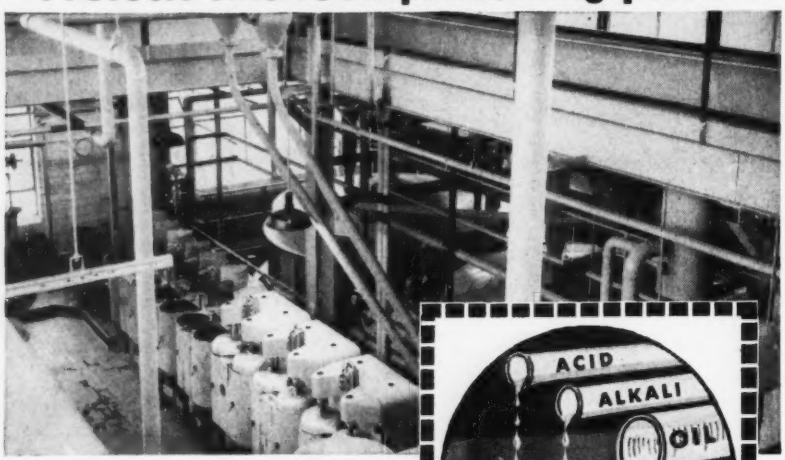
There is some reason to suspect that Oilgear Fluid Power with its wide range of advantages may solve some of *your* machine design problems and make the results very pleasing and profitable. Why don't you really find out? THE OILGEAR COMPANY, 1580 West Pierce Street, Milwaukee 4, Wisconsin.

OILGEAR

OILGEAR

VALDURA VALPON

Protects this food processing plant!



Competitive tests determined the specifications for protective finishes in this famous food plant. And Valdura's Valpon was the winner! Valpon, incorporating the wonderful new Epon Resins produced by Shell Chemical, provided the most protection against

- ★ **OILS...** animal, vegetable or mineral
- ★ **ACIDS**
- ★ **ALKALIES**

For proof

of Valpon's resistance to acids, alkalies, and oils—ask the Valdura representative for a demonstration. *Seeing is believing!*

If you'd like to know more about Valpon and other items in Valdura's complete line of specialized maintenance products, or if you'd like help with a particular problem, just state your wishes on your regular letterhead and mail to the address below. Your inquiry will be treated as an invitation to provide service... not as a license to exert selling pressure!

VALDURA PAINTS THAT ENDURE

VALDURA HEAVY DUTY PAINT DIVISION
AMERICAN-MARIETTA CO.
101 E. Ontario St., Chicago 11, Ill.

continual control purposes. A direct recording attachment is an available accessory.—*Drage Products, 406 32nd St., Union City, N. J.*

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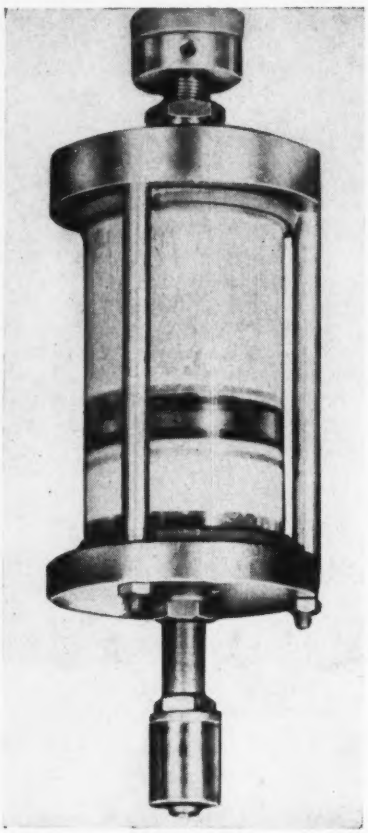


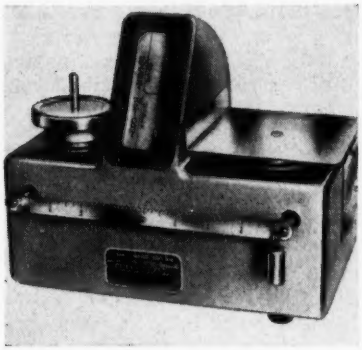
Volumetric Attachment Ups Filler Efficiency

Filling at high speeds to within tolerances of ± 1g. is reported with use of a volumetric attachment on a liquid filling machine.

Unit is termed ideal for filling aerosol containers, since control of amount of propellent used is established, thus preventing waste or misuse of these gases. Device can be installed on all liquid filling equipment, gravity, vacuum or volumetric.

Unit consists of special type filling heads, which are adjustable for variation of fill by means of a specially threaded cylinder to a tolerance of ± 1g. per cylinder revolution. Receptacles become part of filling operation and they are first filled through a special valve to specified amount, then discharged automatically into containers—*MRM Co., Inc., 191 Berry St., Brooklyn 11.*

Circle 182A on Reader Service Card



Precision Scales Combine Speed With Accuracy

Sensitivity, low maintenance and speed in weighing operations are advantages claimed for new scales added to the Shadowgraph line.

The 4200-B series incorporates same type of reflected shadow indication as supplied on previous models. It has center tower design, with commodity platter and weight platter on opposite sides. Beam is mounted parallel to dial so that it is in direct line of operator's vision. This is of value when operation requires frequent changing of poise setting on beam and placing of different weight increments on platter.

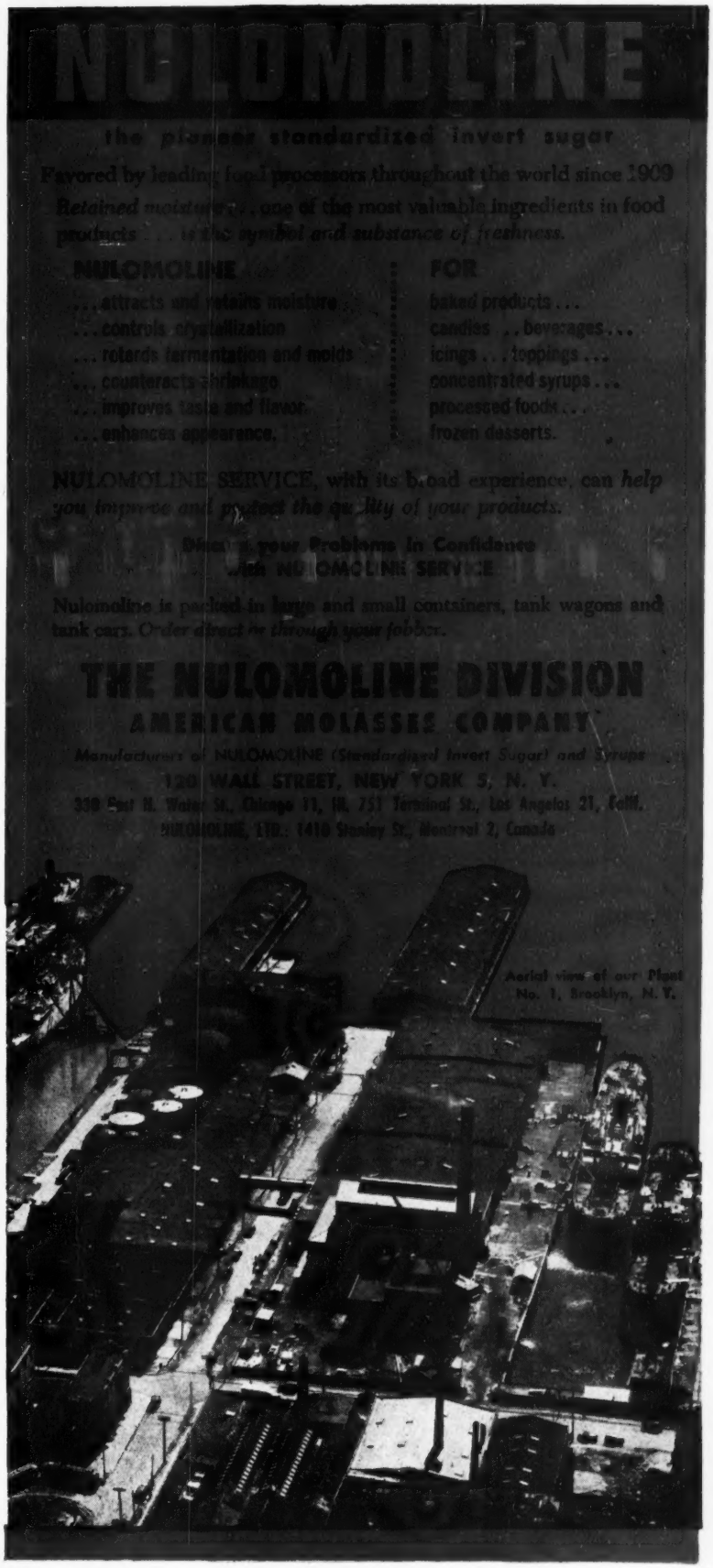
Models are available in a range of capacities from 50g., sensitive to 12mg., through 1,500g, sensitive to 340 mg.—*Exact Weight Scale Co.*, 944 *West Fifth Ave., Columbus 8, Ohio.*

Circle 183A on Reader Service Card

Conveyor Buckets Stay Upright In Any Plane

Materials can be carried without spillage by this bucket conveyor in a horizontal, vertical or inclined plane.

Buckets are held a fixed distance away from the trolley chain and beam, by a bracket, which prevents them from swinging loosely against the chain and spilling on vertical or inclined runs.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the pioneer standardized invert sugar
Favored by leading food processors throughout the world since 1909
Retained moisture . . . one of the most valuable ingredients in food products . . . is the symbol and substance of freshness.
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. . . improves taste and flavor
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processed foods . . .
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NULOMOLINE SERVICE, with its broad experience, can help you improve and protect the quality of your products.
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with NULOMOLINE SERVICE
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AMERICAN MOLASSES COMPANY
Manufacturers of NULOMOLINE (Standardized Invert Sugar) and Syrups
120 WALL STREET, NEW YORK 5, N. Y.
Aerial view of our Plant No. 1, Brooklyn, N. Y.

For more information, use coupon on page 227.

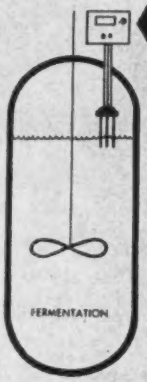
Let Beckman exact pH control

Supervise your production

TWO TYPICAL FIELDS OF APPLICATION

BIOCHEMICAL PROCESSING

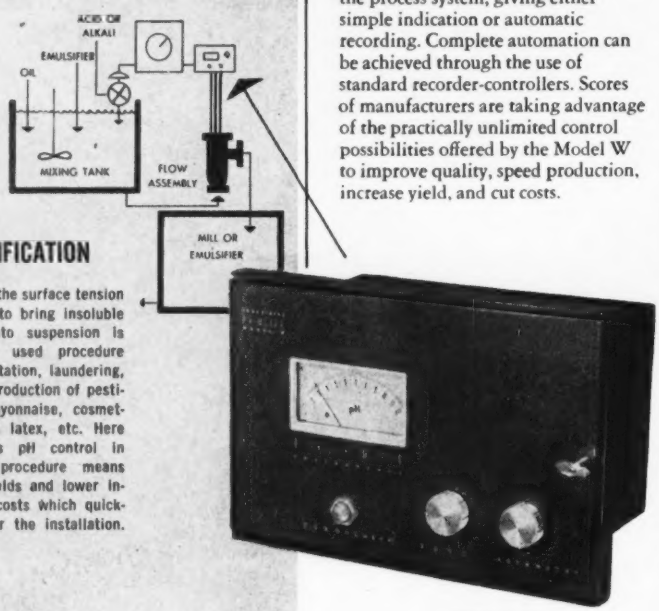
Micro-organisms grow and enzymes act efficiently only within a narrow pH range. Any deviation reduces the yield — with a corresponding financial loss — and may even result in an entirely different product. Thus it is obvious why virtually every pharmaceutical manufacturer, distiller, brewer, etc. uses Beckman pH instruments to control reaction, and frequently the extraction and pH of the final product itself.



Present-day living depends upon exactly controlled volume production of countless materials — foodstuffs, beverages, medicinals, drinking water, and hundreds of process ingredients. Precise pH regulation provides one of the most important means of controlling processes involving aqueous fluids.

Beckman, the pioneer in this field, now offers the Model W Industrial pH Meter which provides new dependability, new convenient size, new maintenance ease (through plug-in units), and new facility for process automatization.

The Model W utilizes Beckman's virtually indestructible glass electrodes, reading accurately even in boiling caustic. These can be mounted in flow or immersion assemblies as far as 200 feet from the instrument. One unit can monitor, manually or automatically, six different points in the process system, giving either simple indication or automatic recording. Complete automation can be achieved through the use of standard recorder-controllers. Scores of manufacturers are taking advantage of the practically unlimited control possibilities offered by the Model W to improve quality, speed production, increase yield, and cut costs.



EMULSIFICATION

Lowering the surface tension of water to bring insoluble matter into suspension is a widely used procedure in ore flotation, laundering, and the production of pesticides, mayonnaise, cosmetics, foam latex, etc. Here continuous pH control in such a procedure means higher yields and lower ingredient costs which quickly pay for the installation.

For more detailed information in regard to the Beckman Model W Industrial pH Meter send for Data File 89-18.

BECKMAN

Beckman *division*

BECKMAN INSTRUMENTS, INC.
FULLERTON 1, CALIFORNIA

Equipment & Supplies

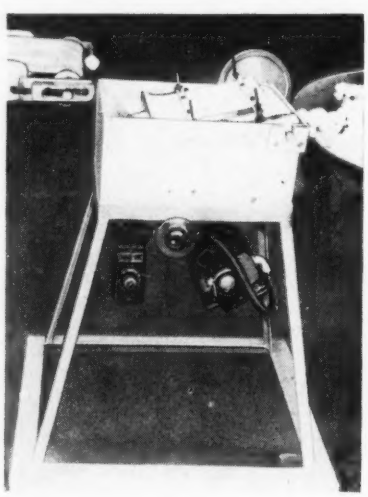
Bucket rotates around its trunnions to remain upright at all times until it reaches tripping rollers at discharge points.

Since bracket, called "Stif-Arm," permits buckets to remain upright, a multiple-plane path may be used with a single conveyor, thus eliminating transfer points. Also, a single drive operates conveyor, eliminating need of separate motor drives for each operation.

Conveyor trolley consists of a single I-beam, which may lie in a horizontal, inclined or vertical position, or include all three. Conveyor path may also have turns in either or both horizontal and vertical planes. A universal-type chain with standard roller attachments runs parallel to the I-beam.

Buckets are self-loading and unloading, and handle bulk cargoes automatically. Tipping rollers for emptying buckets may be located in a fixed position, and can be manually or electrically controlled.—*Hapman Conveyors, Inc., Kalamazoo, Mich.*

Circle 183B on Reader Service Card



Roll Buttering Machine Ends Pan Greasing

Greasing of roll pans and tins is eliminated by a new buttering machine. Unit butters rolls at high speed without waste of product, and effects savings in application time and labor.

Further, use of butter improves taste and gives baker a better product for sweet rolls, cloverleaf, brown and serve, hams and franks. Compact machine coats rolls lightly and evenly with liquefied butter as they are fed in from moulder. Butter remains in a liquid state by means of a heater

Dow Propylene Glycol, U.S.P., for fine food flavors

High solvent action over a wide range of materials makes this safe solvent by DOW a sure bet for improving food flavors and extracts

It's the highly efficient solvent action of Dow propylene glycol, U.S.P., that makes it a growing favorite of so many formulators of fine flavors and extracts. But almost as important is the wide range of flavoring raw materials on which it acts. You can translate these advantages into even greater economy and efficiency in your own operation when you replace other solvents with propylene glycol.

Food colors, emulsified flavors and flavor concentrates—these, too, benefit from propylene glycol's good solvent action. Many makers of food colors have substituted propylene glycol for other solvents with very slight alteration in formula and remarkable savings. Big advantage for the popular emulsified flavors is the wetting action of propylene glycol which increases the stability of these emulsions.

Give Dow propylene glycol, U.S.P., a trial in your formulations—you'll be pleasantly surprised with the results. Write for your free sample. THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. OC 827E.

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you can depend on DOW CHEMICALS DOW

For more information, use coupon on page 227.

Exposes foreign matter and residue! Resists oils, acids, alkalies!

Globe White Neoprene Rubber Belting installed on leading make conveyor.

EXPOSED: Dust, dirt and other accumulations! Product particles that are left behind!

The snowy whiteness of Globe White Neoprene Belting exposes them all to certain detection, enabling immediate elimination with hot water or live steam. *That's sanitation-plus!*

Known as the do-all conveyor belting of the food industry, for which it was specifically developed, Globe White Neoprene Rubber Belting consists of multiple layers of hard-woven, light duck, molded together with highest grade neoprene rubber between the plies and over the entire surface . . . finished with a 3/64" thick, satin-smooth cover on the carrying side and with a friction surface on the pulley side.

The characteristics of this type of construction are unmatched: Exceptional flexibility; high tensile strength; minimum stretch . . . all extremely advantageous in operations where head and tail pulleys are small, and on machines with limited take-up facilities.

Resistant to oil, grease, acids, alkalies — possessing a satiny smoothness that makes no impression whatsoever on the product conveyed, Globe White Neoprene Rubber Belting is today on the "must" list of numerous food processing and handling concerns.

Standard widths up to 48", in 2-6 plies inclusive, are available. Also available in Black. Ask about Globe White Ruff Top Neoprene Incline Belting, Globe Brown Neoprene Belting, with friction surface on both sides, and Globe Brown Kling-Top Neoprene Belting, with non-slip top for incline and decline.

Write Dept. E for free samples, literature and the name of your local distributor.

GLOBE WOVEN BELTING CO., INC.
1400 CLINTON STREET • BUFFALO 6, NEW YORK
KNOWN FOR QUALITY THE WORLD OVER

Equipment & Supplies

and thermostat, and only amount needed is applied.

An integral unit, the device is placed in line with present equipment. Installation costs are negligible. In operation, high rate of roll production were attained when rolls were fed directly into machine from moulder. —*R. G. White Engineering Co., 1338 Atlantic Ave., Brooklyn 16.*

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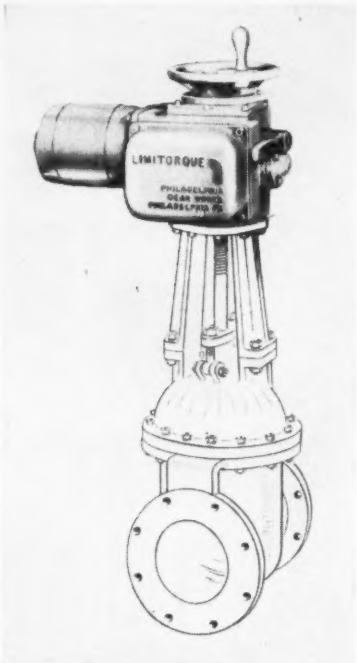


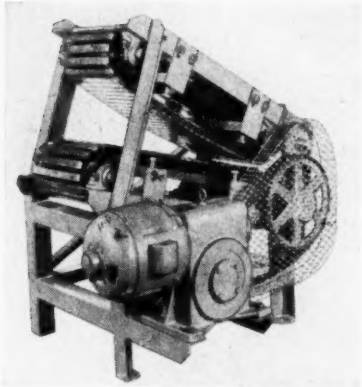
Motorized Controllers for Small Valves

Gate, plug and butterfly valves, ranging in size from ½ to 8 in. can be motorized with new controllers.

Called LimiTorque, these operators may be controlled electrically from any conveniently located pushbutton station. In case of a power failure, a handwheel is incorporated in control unit for manual operation.

Equipment limits amount of torque applied to valve operating members, thus preventing possible damage to stems, discs and valve seats due to overloading. Units are furnished with two limit switches. One is a torque switch, which provides uniform valve seating thrust yet gives positive protection to valve parts from overload. Second switch is geared limit which acts as a simple limit switch for both directions of stem travel.—*Philadelphia Gear Works, Erie Ave. and G St., Philadelphia 34.*

Circle 186A on Reader Service Card



New Can Crusher Reduces Storage, Handling Cost

Savings of up to 90% in storage space are claimed for this unit, which automatically flatens cans to $\frac{3}{8}$ in. thickness and discharges them into crates or carts. Crusher can be used with its companion unit, the Opener to form a continuous production line.

Machine handles all cans up to gal. size. It receives cans into throat between two conveying-crushing belts. As cans move to discharge end, they are crushed by converging heavy-duty belts. Roughened belt links prevent slippage.

Further economy is achieved through higher salvage prices paid for crushed cans and savings in shipping space.

Unit measures 6 ft. x 3 ft. 6 in. x 4 ft. It uses a standard 3 hp., 220/440v.,60 cycle 3 phase, gearhead motor. Net weight is 900 lb.—*F. H. Langsenkamp Co., 237 East South St., Indianapolis.*

Circle 187A on Reader Service Card

New Chemicals

New Chlorinated Cleaner For Permanent Pipelines

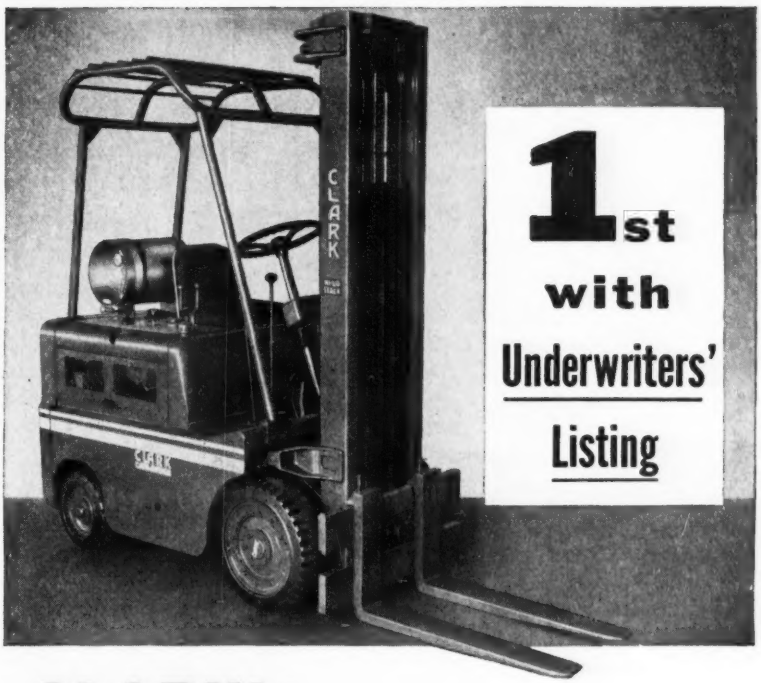
Bright, film-free surfaces are reported with use of a new chlorinated cleaner for permanent cold milk pipelines and equipment.

Known as Cle-Chlor, product has been field tested for over a year under

Want More Information?

It's free—and easy to get. Simply note here the items on which you want more details, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service postcard—page 227. Then sign at the bottom and mail.

For your convenience, too, items in this department are listed and keyed in the Reader Service Section.



CLARK's L.P.–GAS CARLOADER*

1. Greatly reduces engine maintenance:

Eliminates unburned carbon deposits and crankcase dilution. Eliminates fuel pump and complicated carburetor adjustments.

2. Eliminates obnoxious exhaust fumes:

L.P.-Gas provides almost perfect combustion, excellent for indoor operations.

3. Provides safe, efficient operation:

Vacuum ignition switch is interlocked with fuel line and manifold, impossible to spill fuel or load-up engine.

High compression head (8.5 to 1) gives maximum economy and power from high octane L.P. Gas.

Quickly demountable tank takes 3 minutes to change.

Stellite valves and seats prevent burning from high flame temperature of L.P. Gas.

Now you can have the advantages of liquified petroleum gas-powered (butane, propane) materials handling, with complete safety. For details, call your local Clark dealer, listed under "Trucks, Industrial" in the Yellow Pages. Or send the coupon for specifications.

*4000 lb. capacity, available with standard shift, Hydratork or Dynatork

Industrial Truck Division **CLARK EQUIPMENT COMPANY**
Battle Creek 14, Michigan ☐ Send details on LPG truck

CLARK® EQUIPMENT

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City_____ Zone____ State_____

THE MARK OF AN EXTRA DEPENDABLE MEAT MACHINE

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The red "power spot" on meat machinery means *powered by Electro Dynamic*, the most dependable motors *ever* available to industry.

For *proof* of this *extra dependability* send the coupon below for your copy of **"MOTOR SHOWDOWN"**, a new candid report on comparative results of motor performance tests* conducted in accordance with A.I.E.E. standards.

*Tests certified by J. Arthur Balmford, Professor of Electrical Engineering at a leading Eastern university.

1 to 250 hp. AC and DC. Standard or special purpose. N.E.M.A. standards.

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149 Avenue A, Bayonne, New Jersey

Please send me a copy of "MOTOR SHOWDOWN" and the new catalog of Electro Dynamic industrial motors.

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COMPANY_____

ADDRESS_____

Equipment & Supplies

numerous in-place cleaning conditions. Effective even in hard water, users find material controls milkstone and since it leaves no annoying fumes, it is easy to handle. Cleaner is available in 30 and 125-lb. plywood drums and in 350-lb. fiber drums.—*Wyandotte Chemicals Corp., Wyandotte, Mich.*

Circle 187B on Reader Service Card

Masking Compounds Cover Off-Odors

Of interest to bakers is a new series of masking compounds that cover the transfer of off-odors from phenolic preparations, used in process of sterilizing boxes and cartons manufactured for cakes and other baked goods, to the food product itself.

New compounds are not foreign to foods, and provide adequate coverage for phenolic solution when used at a rate of approximately 1 oz. per gal.—*Dodge & Olcott, Inc., 180 Varick St., New York City 14.*

Circle 188A on Reader Service Card

Cleaning Compound Has Improved Properties

Increased germicidal action is reported for a standard cleaner, X-4, recently improved. Most significant improvement is increase in active chlorine from 4.62 to 6.4% sodium hypochlorite—about 40%. New mixture is claimed to do one-third again as much work as former product, a gal. of it making over 500 gal. of 100 ppm. sanitizing solution.

Germicidal powers have been increased by an 80% reduction in excess alkalinity. Thus usual-use dilutions have a lower pH, providing improved bactericidal action, and are kinder to hands.—*Klenzade Products Inc., Beloit, Wisc.*

Circle 188B on Reader Service Card

OTHER DEPARTMENTS

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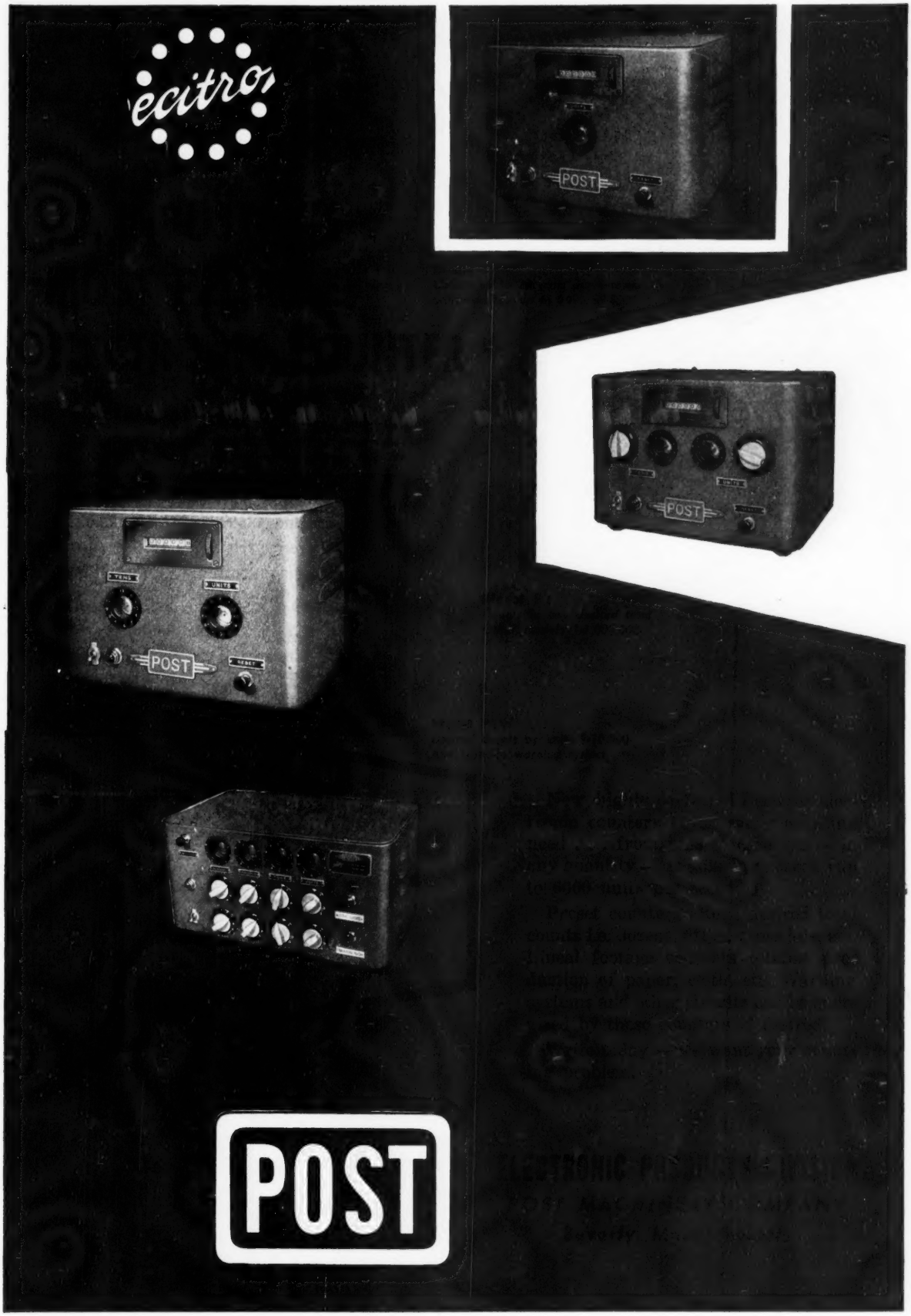


For more information, use coupon on page 227.

since 1887 / Glycerine helps maintain the Flavor

Glycerine can perform an unusually wide range of functions for food processors. Take flavoring products for example. Glycerine is often the principal solvent; the compatibility of its own pleasant taste with other flavors is a valuable asset; and its viscosity adds body.

In candy making, Glycerine lends smoothness and increases softness and palatability. In the manufacture of meat casings, Glycerine acts as a plasticizer—promoting flexibility by retaining moisture.

In the processing of ice creams, wines and beers, dried fruits and nuts, bakery goods and many other food products, U.S.P. Glycerine is chosen for its ability to act as a humectant, sweetener or solvent. In all these capacities, Glycerine helps to maintain food flavor and quality right through to the ultimate consumer. And, what is very important, U.S.P. Glycerine's freedom from toxicity makes it safe for use in food products.

For almost 70 years, confectioners, bakers and soda fountains have used flavoring extracts made by W. Sheinker & Son. For all these years, W. Sheinker & Son has found that U.S.P. Glycerine is an excellent solvent for the company's flavoring extracts.

Nothing takes the place of Glycerine

TECHNICAL DATA

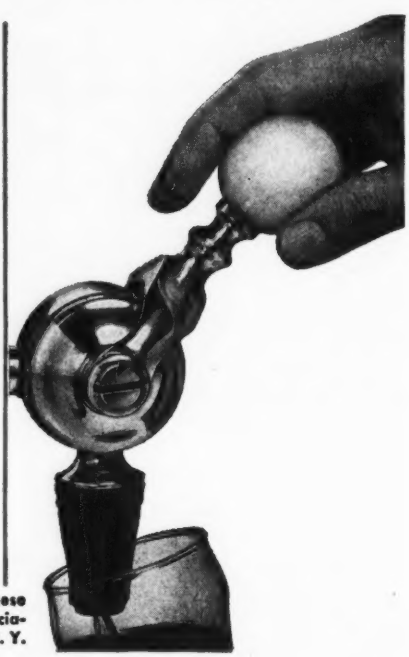
which you should have

20-page booklet on Glycerine for product conditioning

12-page booklet on Glycerine standards and specifications

16-page booklet on Glycerine properties and applications

For your free copy of any or all of these booklets, write Glycerine Producers' Association, 295 Madison Avenue, New York 17, N. Y.



Equipment & Supplies

Two New Film Adhesives For Use With Mylar

Unusual sterilization resistance and long-term high-temperature resistance with high dielectric strength are important properties of two adhesives developed for use with Mylar film.

Offering high dielectric strength, Bondmaster L272, which has been specifically formulated for the manufacture of laminations used in slot insulations, phase insulation, motors, core and layer insulation in transformers, etc., is claimed to retain full bond strength after constant exposure to 320 deg. F. for 672 hr. (4 weeks).

A second, clear, formulation, Bondmaster L440, has been developed for the bonding of Mylar to paper for sterilization resistant applications and is said to retain a strong, fiber-tearing bond without discoloring after being subjected to a live steam sterilization chamber for 30 min. at 250 deg. F. Unusual resistance to hydrolysis, it is claimed eliminates softness.—*Rubber & Asbestos Corp., 225 Belleville Ave., Bloomfield, N. J.*

Circle 103C on Ready Service Card

Plant Lighting

—*Continued from page 60*

Inspection of cans is somewhat more difficult because of the highly reflecting surfaces of the cans and the lack of contrast between the different parts of the can. There should be mirrors behind the moving row of cans in order to see the side facing away from the inspector and above them at a 45 deg. angle for viewing their interiors (Fig. 4).

Further, luminous panels or walls painted flat white and illuminated to 400 footlamberts by indirect lighting should be used, and the booth should be completely enclosed (except at the bottom) to cut out all reflections from the rest of the plant. The floor should be painted white.

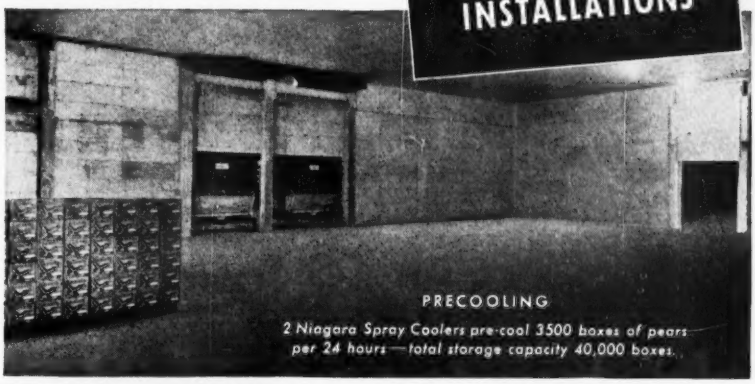
Rate of speed of containers through the booth should be determined experimentally.

Cutting Rooms. Uniform lighting should be provided for all inspection work. Natural daylight is preferred by many. But since daylight is variable in quality, and not always available, a constant source of artificial light is recommended.

Ceiling of the cutting room should be painted white and the walls a very light neutral gray or green with a reflection factor of 65% or more.

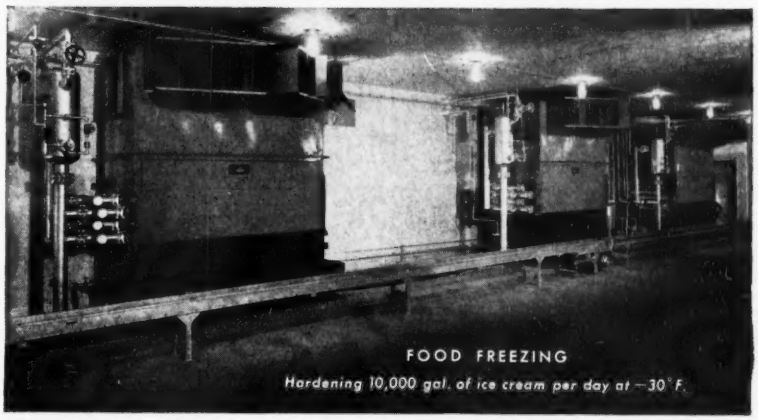
NIAGARA "No-Frost"

SUCCESSFUL IN BIG INSTALLATIONS



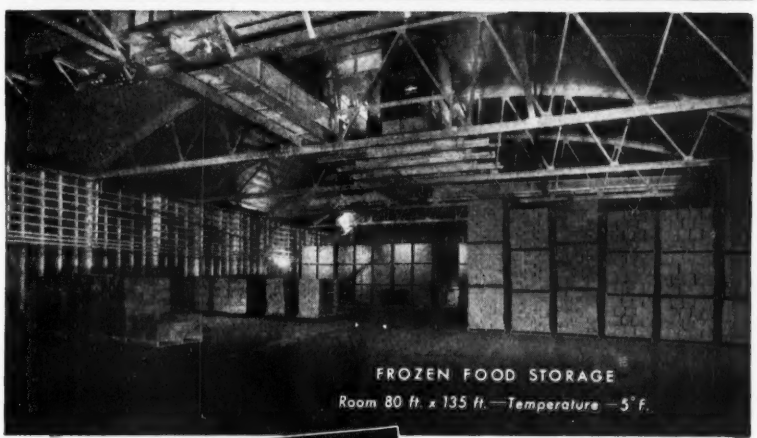
PRECOOLING

2 Niagara Spray Coolers pre-cool 3500 boxes of pears per 24 hours—total storage capacity 40,000 boxes.



FOOD FREEZING

Hardening 10,000 gal. of ice cream per day at −30° F.



FROZEN FOOD STORAGE

Room 80 ft. x 135 ft.—Temperature −5° F.

NIAGARA "No-Frost" gives you extra capacity and better operation. It improves quality, especially in foods, where it brings the product to correct temperature faster and holds it without fluctuation. It saves money for you in the cost of power and labor. With Niagara "No-Frost" there is never any "de-frosting" loss of time or temperature rise.

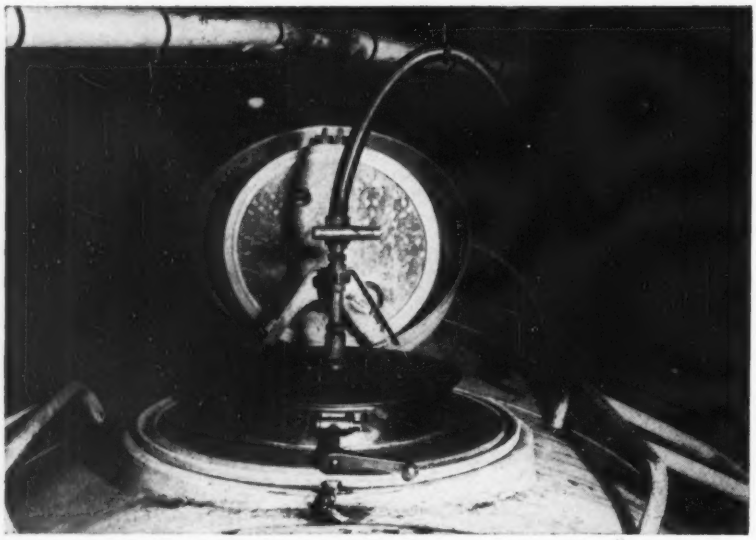
Write for Bulletin 105

NIAGARA BLOWER COMPANY

Dept. FI, 405 Lexington Ave. New York 17, N. Y.

Sales Engineers in Principal Cities of U. S. and Canada

For more information, use coupon on page 227.



How NEW Rotary Sprayer Cleans Tank Car Interiors in 1/10 Former Time

User of mechanical spray cleanser also saves on materials and hot water—he reports better results, too.

Cleaning the insides of a large over-the-road tank truck was extra tough at this well known edible oil refinery, because 1500 gallon tank compartments held tenacious heavy-bodied core oil, and also a mixed vegetable-fish oil. They had to be filled with water, charged with caustic, and boiled for 6 to 8 hours before dumping and rinsing. This cleaning method was time-consuming, hazardous, and not always too effective. Could Oakite help them?

The Oakite Technical Service Representative arranged a demonstration of the Oakite Rotary Sprayer. The unit was set into the tank opening and a 200°F solution of Oakite Composition No. 24 was sprayed at 90 lbs. pressure for 20 minutes. This was followed by a 180°F spray rinse. Then a five minute cold water hose rinse.

Results: Tank completely clean with a 6½ hour saving on time. Tremendous quantities of hot water also saved—plus a $15 saving on material for this one job alone.

Proving that... in industrial cleaning it always pays to consult Oakite.

MANY WAYS OAKITE CAN HELP YOU

Oakite offers over 80 specialized cleaning materials, up-to-the-minute methods and equipment, plus long experience—all of which make short work of sanitation in food plants. More information in this booklet. Write Oakite Products, Inc., 26G Rector Street, New York 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. and Canada

Glossy finish should not be used, but a matte or eggshell finish employed.

A light source similar in quality to that of daylight should be employed for critical inspection areas and 75-150 footcandles of illumination provided. A light hood painted white (75% reflection factor or better) may be used to surround the special lighting used for critical grading.

Environmental Surfaces

Ceilings should be painted white with a 75% reflection factor to reflect the maximum amount of light downward. Walls should be a light gray, green, or other neutral color (50-65% reflection factor) to provide high utilization of light, but a brightness somewhat less than that of the work area. White conveyor belts are advised for use in canneries. Machines should be painted a light color (30-50% reflection factors) and the underside of structures should be painted white with a high reflection factor (65% or more) to reduce harsh shadows.

Aluminum or glyptal base paint in light colors (e.g., off-white, cream, very light gray, or green, etc.) is recommended for painting surfaces requiring high reflection factors. Attention should be paid to the use of color in painting machinery and equipment to provide pleasant environment in the plant and to promote safety by calling attention to potential hazards.

Lighting Units

Here, we will call attention to the various types available.

For direct lighting of areas where non-critical seeing tasks are performed, incandescent lights with dome or glass reflectors can be used. Designation of these lamps as "RLM" (Reflector Lamp Manufacturer) indicates conformance to standards.

For intermittent (not prolonged) seeing tasks, incandescent, diffused lights, such as the combination glass-and-steel diffuser or silvered lamp diffuser types are advised.

Where critical seeing tasks are performed and 30 or more footcandles are required, fluorescents generally are preferred because they provide a light source of lower brightness, are more efficient in their use of power, and produce less heat. Diffusing covers provide lower brightness and minimize glare. However, louvers may be desirable to provide a higher cut-off angle and a greater concentration of light on a limited working area.

In general, the maximum spacing of direct lighting units should be 1 times the mounting height, except that louvered fluorescent units should be spaced 0.9 times mounting height.

When you think of saving...
Think of TAPE!

Famous "Scotch" Brand Cellophane Tape is a time-saving, money-saving tool for every packaging problem. Remember, it's crystal clear and sticks at a touch—tighter than ever before. Use it for holding, joining, protecting—any of a thousand different jobs. Tape does it faster, better, cheaper!

For further information, just write on your letterhead to Department FE-94.

CELLOPHANE TAPE...ONE OF 300 PRESSURE-SENSITIVE TAPES for industry, trademarked...

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The term "Scotch" and the plaid design are registered trademarks of Minnesota Mining and Manufacturing Co., St. Paul 6, Minnesota. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ontario, Canada.

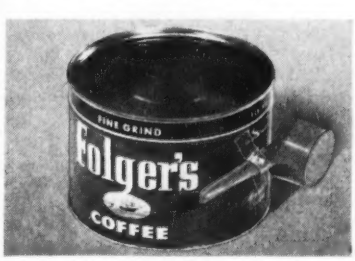
3M COMPANY

LOOK what you can do with it!

PUT EXTRA SELL on your combination "deals" with printed "Scotch" Brand Cellophane Tape. Back of "deal" can be held with transparent cellophane tape to avoid covering printing.

COMBINE two dissimilar products by banding them together with "Scotch" Cellophane Tape. Transparent tape allows labels to be read easily . . . doesn't interfere with printed designs.

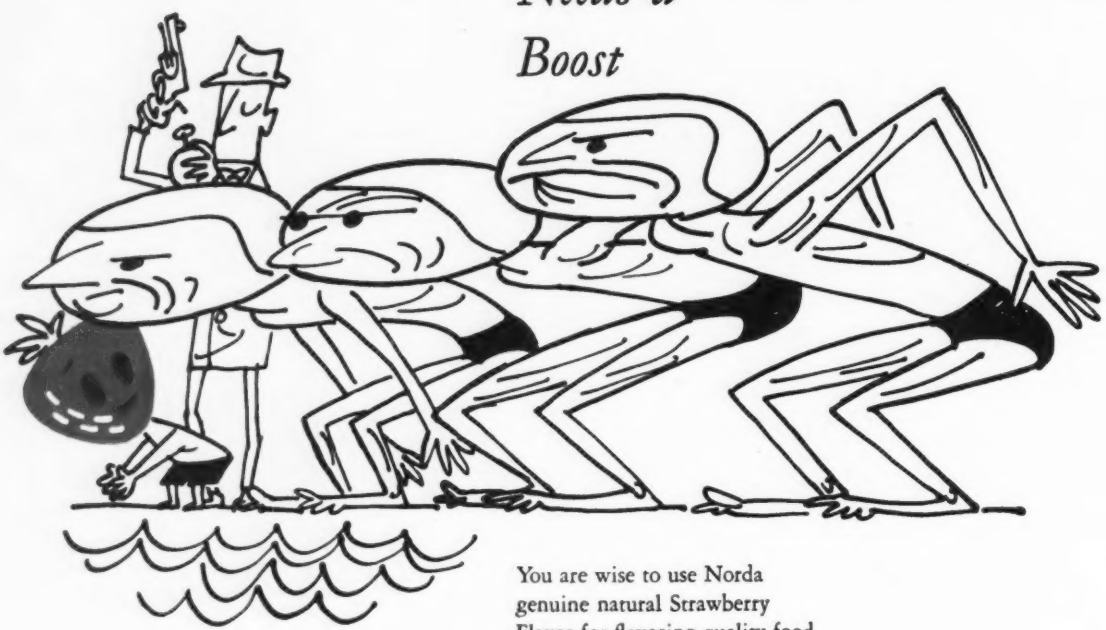
ADD PREMIUMS neatly and securely with cellophane tape and a "Scotch" Brand Definite Length Dispenser, Model 92. Dispenser turns out set length of tape ready for application.



ATTRACT customers to your shelf displays with that profitable "something extra". Premium units like this coffee and measuring cup are easily formed with "Scotch" Brand Cellophane Tape.

For more information, use coupon on page 227.

When a Strawberry Needs a Boost



You are wise to use Norda genuine natural Strawberry Flavor for flavoring quality food products. They will always be uniformly fine, and they'll always be popular.

If it might increase your costs, and cut into your profits, to use only such a natural fruit flavor, consider supplementing it with Norda imitation Strawberry.

Norda imitation Strawberry Flavor is the perfect team-mate for the genuine article. Its characteristics are amazingly similar. It has the real fruit taste, its full-body, its concentrated strength and richness.

Try this profit-making combination. Test both of these outstanding Norda Strawberry Flavors by sending today for free samples.

–Come to Norda

Use a Norda "Favorite to Flavor It"

Norda

Norda, Inc., 601 West 26th Street, New York 1, N. Y.

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Projector spot or flood lamps may be employed to illuminate special machinery or to increase light on certain critical areas. But these are not recommended for general lighting.

Indirect lighting is by lighting fixtures that project all or a portion of their light upward toward the ceiling. These produce a well diffused and uniform type of lighting. But they are dependent on the ceiling having a high reflection factor for maximum efficiency.

This type of lighting is used mainly in offices, laboratories, cutting rooms, and rest rooms. Maximum spacing for these lights is 1.2 times the ceiling height for incandescent units and 1.2 times mounting height for fluorescent units.

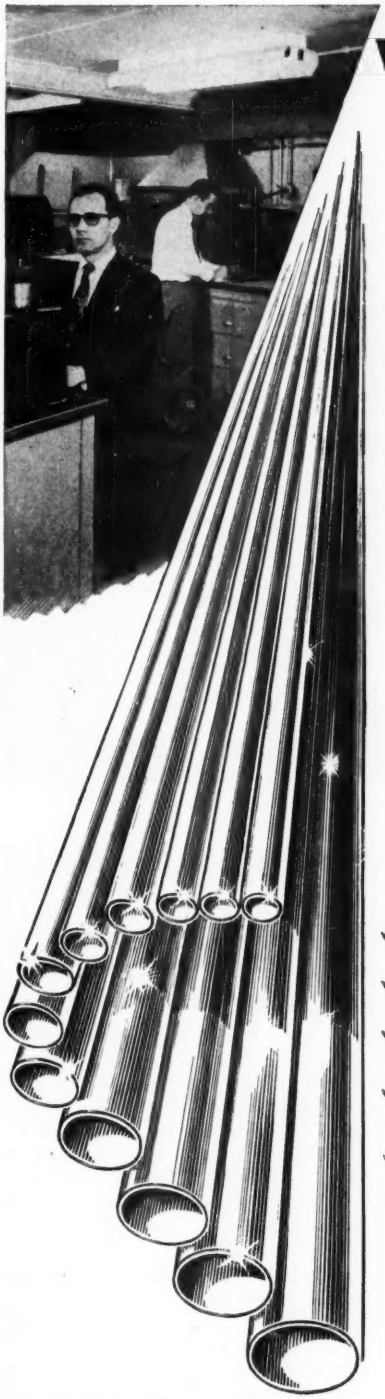
Units for Critical Color Grading

Attempts have been made to produce artificial lighting units that are the equivalent of natural daylight. In general, incandescent lights produce too great a proportion of light at the red end of the spectrum and an insufficient amount in the blues. Ordinary fluorescent lights are deficient in red light, also are slightly deficient in light in the violet and green portions of the spectrum.

Energy distribution of fluorescent light markedly can be improved by use of phosphors that augment quality of the light. But these decrease, to a certain extent, the efficiency of energy utilization. A mixture of "cool white" and "warm white" tubes, in the proportion of two cool whites to one warm white, has been suggested for improving light quality when using fluorescents.

Nearest approach to daylight probably can be obtained by high wattage incandescent bulbs and special daylight filters. These units, however, are highly inefficient in their utilization of energy and require an elaborate cooling system for the larger units. Generally, they are considered to be too expensive for all but the most critical color work. A simpler and less expensive unit was developed according to specifications of S. R. Whipple (of the California State Department of Agriculture, Bureau of Fruit & Vegetable Standardization) for the grading of peaches and tomatoes. Used extensively in California by State inspectors, this unit has found favor with several food processors. But it exaggerates the red color of tomatoes and other red products to a certain extent.

Fluorescent lamps have the disadvantage that the light they produce is affected by the intense blue light of the mercury vapor used in their construction. These so-called "mercury bands" can be somewhat suppressed



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From start to finish . . . rolling the strip . . . tube forming and welding . . . cold drawing . . . annealing and pickled or polished finishes . . . modern instrumentation provides a continuous quality control on Wallingford stainless tubes and pipe. That's why Wallingford tubing is the finest protection you can give your fluid food.

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Where corrosion resistance, cleanliness, durability and prevention of product contamination are vital factors, specify Wallingford Stainless Tubes and Pipe, produced in a completely integrated mill, where quality control prevails from raw material to finished product.

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STAINLESS • ALLOY • HIGH CARBON • LOW CARBON • STRIP • STAINLESS WELDED TUBES AND PIPE

For more information, use coupon on page 227.

Remember in school they used to tell you that some things were about as *incomparable* as apples and oranges?

These days, many food processing formulas contain ingredients that in relative mass, texture and specific gravities are about as incomparable . . . and as difficult to blend together. Proper dispersion of trace ingredients, vitamin supplements or small amounts of seasoning and a host of other ingredients, common to everyday food processing, calls for careful attention to your mixing practice and equipment . . . and that's why more and more food processors are relying on Simpson Mix-Mullers for *controlled* mixing.

In a Simpson, components of the mix are not merely stirred together or placed next to each other. Stirring *is* accomplished—by special wear resistant plows; but to the stirring is added a *mulling* action. Spring loaded muller wheels provide a smearing spatulate action that doesn't crush—but serves to intimately *blend* one material with another . . . a blend that *stays* mixed and will not segregate in storage or in transit.

Write today for details and remember—mixing is our business . . . our only business for over 37 years.

SIMPSON *MIX-MULLER*® DIVISION
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by the use of various phosphors in the fluorescent tubes, and by use of incandescent light sources in conjunction with the fluorescent lamps.

These latter provide more red light, in which fluorescent light is deficient, and the combination affords a quality of illumination more nearly like daylight than either fluorescent or incandescent light sources alone. Several units containing these combined light sources are on the market.

Cheapest form of illumination is natural daylight and it may be used to advantage in most industrial establishments. It has been shown that vertical windows in outside walls produce, on the average, about 30 foot-candles of light at a distance back from the windows equal to twice the height of the window. Dirt will reduce this to about 1½ times the height.

Sawtooth construction produces very satisfactory light, particularly if the walls and ceiling and the roof outside the windows are painted with a white paint with a high reflection factor. A ratio of spacing between rows of windows to mounting height of 1 is ideal, but ratios of 2 or 3 are acceptable.

Monitor construction permitting light to enter from either two or four directions also can be used. The spacing between opposite windows should be equal to, or greater than, three times the window height. Overhangs, shades or louvers should be employed to exclude direct sunlight.

It should be kept in mind that dirty windows do not permit entrance of as much light as clean ones. Vertical windows are easier to keep clean than tilted or horizontal ones. Total area of windows should be 25% of the floor area if the windows are kept clean, and 35% if cleaned only infrequently for an inside illumination of 30 foot-candles.

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Above article is taken from Lighting in Canneries, a talk given by the author at this year's Annual Short Course for Canners of the Canned Foods Assn. of British Columbia.

End (Resume reading on page 61)

"Naturally," Food Sells Better...

When You Sell

NATURAL FRESH FLAVOR

intensified by Zest®

ZEST brings out the true garden-fresh flavor that nature put *into* your vegetables . . . prevents the gradual "flavor-fading" that may be robbing your brand of profit-making taste appeal. Step up quality with fuller flavor. Add ZEST, Staley's 99+% pure monosodium glutamate, to your canned and frozen vegetables, soups, fish, stews, poultry . . . and scores of other foods.

ZEST intensifies natural flavor *already in* your foods without adding flavor, aroma or color of its own. Freezing reduces the level of amino acids. ZEST restores this loss. ZEST is effective in tiny amounts either before, during or after processing. After using ZEST, food processors instantly notice a marked flavor improvement. Write today for all the details about the seasoning that makes foods sell better!

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Gentlemen: Send me all the facts about ZEST—the amazing seasoning that boosts natural food flavors.

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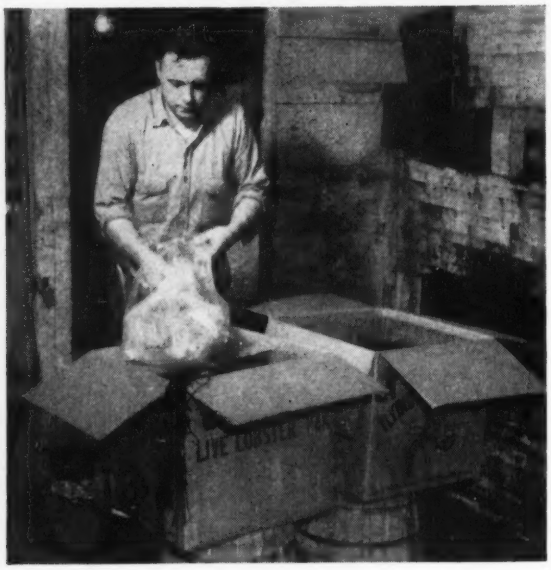
NEW PACKAGES & PRODUCTS

LIVE LOBSTERS are selected from storage tanks and packed into special Live Lobster-Pak boxes at Burroughs Sea Food Co., Boston.



ICE PRESERVATIVE is placed above seaweed and cracked ice. Air shipments of 40 hours have been successful because of careful packing.

Live Lobsters Shipped By Air In New Package

Thanks to a specially-designed, leakproof corrugated box, live lobsters can now fly to their destinations in cool comfort. The result of four years of intensive research by Hinde & Dauch, Watertown, Mass., the carton was directed at solving three primary lobster-shipping problems: keeping the crustacean alive and cool, preventing brine leakage, and reducing package weight.

Formerly, wooden barrels and fiber containers had been used, keeping the lobster in good condition, but eliminating possibility of air shipment by not complying with the other two requirements.

With the new carton, however, major airlines have accepted shipments since spoilage of other cargo through brine leakage is prevented, and since light weight of the package brings air shipment rates within the range of the economy-conscious shipper.

Specialized feature of the box is the interior packing pieces designed for it. These consist of Insulpak cushioning pads for the bottom, top, and sides, a pair of paraffined trays, and a series of water-absorbent pads.

A plypak pad, to cushion the box's contents, is placed in the bottom of a 19x19 in. box. Next, the water absorbent pad is put in the box, and Insulpak liners around the sides. Then a parafined tray and three more absorbent pads are inserted.

Fifty pounds of live lobsters are packed in the box and another absorbent pad placed on top and covered with seaweed, cracked ice, and an ice preservative. An additional absorbent pad, another paraffined tray, and a final Insulpak pad complete the packing operation. Closed and tied for shipment, the entire unit weighs 65-lbs.

Known as the Live Lobster-Pak, the box has been tested by three airlines with satisfactory results. Shipments up to 40 hours have been made without leakage or damage to the lobsters.

Plans are being drawn up for a smaller carton for consumer use. Equipped with a carry-home handle, it will hold eight or nine chicken lobsters and will serve as an over-the-counter unit or a package for short trips. The pack can be refrigerated if desired.

The Live Lobster-Pak is currently in use at Burroughs Sea Food Co., Boston.

For Package Data Use Reader Service Card

Tinned Potato Salad

The result of a long period of research, canned German style potato salad is being processed by Charles G. Summers, Jr., Inc., New Freedom, Pa. Packaged under the Superfine label, the product contains bacon and a sweet-sour sauce characteristic of old-style German potato salad.

Complete and ready-to-serve, the salad is ideal for quick summer meals. The pound of potato salad packed in each can does not require refrigeration until the can is opened.

The red, white, and blue label features an appetizing photograph of the contents as served on consumer tables.

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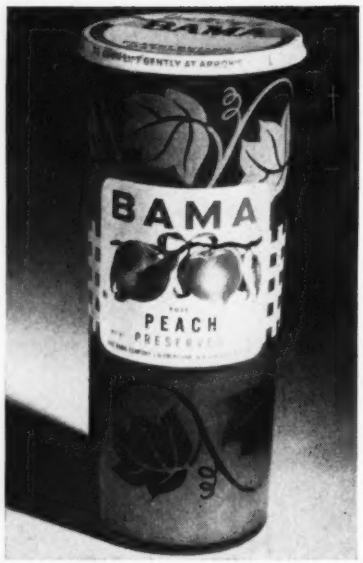


Jumbo Jelly Jars

Giant 20-oz. tumblers are being used by Bama Co., Birmingham, Ala., for their line of preserves and jellies. Decorated with a color-applied ivy-leaf pattern, the tumblers are closed with a "vapor-vacuum" cap by White Cap Co., Chicago. Re-usable, the glasses are ideal for iced tea and other summer beverages. Containers are by Owens-Illinois Glass Co.

For Package Data Use Reader Service Card

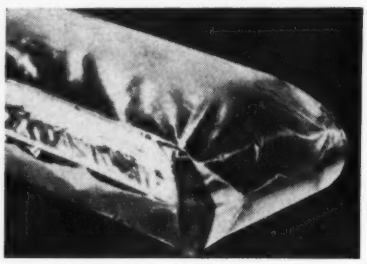
New Club Cheese

A sharp club cheese is being processed by Armour and Company under the Miss Wisconsin label. Made of aged cheddar, the product is overwrapped with cellophane and packed in a red plastic dish. Weighing 6-oz., the cheese spreads when kept at room temperature, and may be chilled before slicing.

Saran Film Liner

Kraft Foods Co. is using a saran film cap liner for their oil products, including mayonaise, salad dressing, sandwich spread, and French dressing. Made of saran laminated to a calendared newsboard, the liner was adopted after exhaustive tests.

It has exceptionally low moisture and gas transmission, chemical and grease resistance, and outstanding aging characteristics, protecting shelf life of the product.



Film Developments

Transparent and transluscent film gusset bags without bottom or center seams (see photo) are being manufactured on Renka machines produced by Geveke & Co., New York. Among advantages are the virtual sift-proof feature and the fact that a printed message can be carried on both ends.

Also of interest to plastic film users is a printing process developed by Transparent Package Co., Chicago. Called Unilox, the process consists of laying ink between two plies of transparent film. The locked-in printing does not come in contact with the food and the printed surface is not exposed to abrasion or scuffing. The multiple construction gives added strength to the package.

For Package Data Use Reader Service Card

Packaged Lettuce

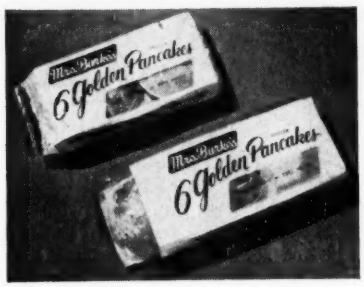
A sturdy tray designed by Standard Folding Trays Corp., New York, is reported to have solved the problem of terminal level packaging of lettuce. Hitherto only attempted on the retail or grower level, the individual wrapping of the vegetable is accomplished through use of standard highspeed overwrapping equipment.

Rigidity of the Tripl-Tite tray al-

lows efficient heat sealing, though conforming to variously shaped heads of lettuce. Rewraps are eliminated and prices for both overwrap and tray range from 1½¢ to 1¾¢.

The wrap eliminates necessity of trimming and wetting down on the retail side, while improving sales appearance of the product.

For Package Data Use Reader Service Card



Packaged Frozen Pancakes

Requiring no defrosting, and ready to eat after two minutes of heating are frozen pancakes processed by Mrs. Burke's Frozen Foods, Philadelphia. Packaged six to a printed cellophane bag designed by Milprint, Inc., Milwaukee, the pancakes are being marketed in the East.

For Package Data Use Reader Service Card

Tropic Wrap for Chocolate

A new aluminum foil packing process for chocolate has been developed by the Swiss Institute for Tropical Studies in cooperation with Suchard Chocolate and the Swiss packaging machine industry. A heremetically sealing process, it is directed at protecting chocolate shipped to tropical countries. The new package is reported proof against water, air, heat, and insects.

Fiber Cans Reported Gaining

The growth of fiber container manufacturing into a $55 million a year industry, has been reported by American Can Co. Illustrated above are some of the food and non-food uses to which the economical container has been put. Evident is the diversification possible in size and shape.

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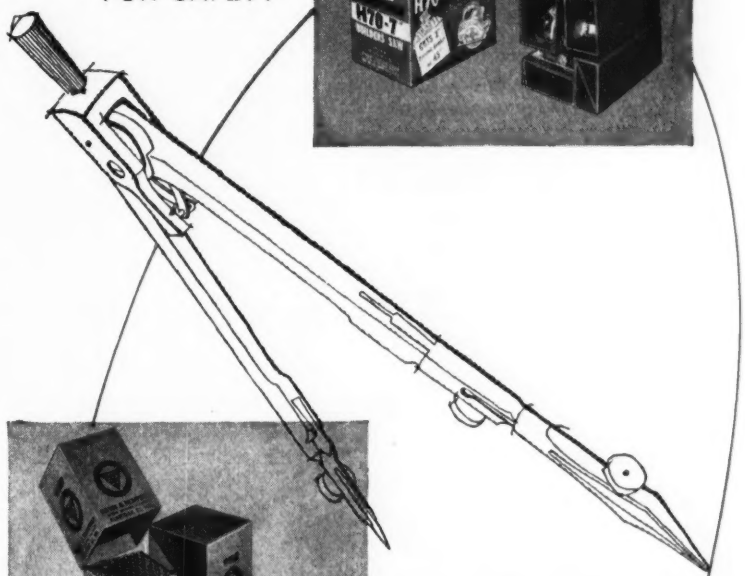
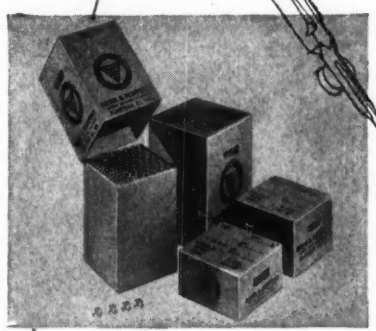
FOR SAFETY





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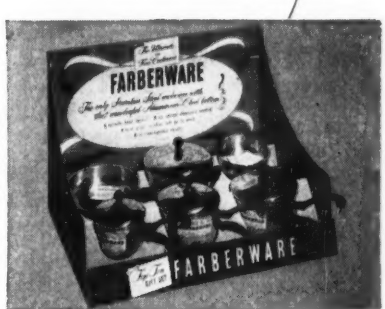

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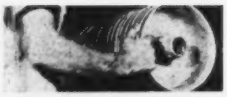
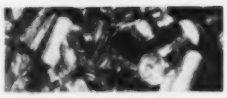
for pans...



and cans...



and cooking vats

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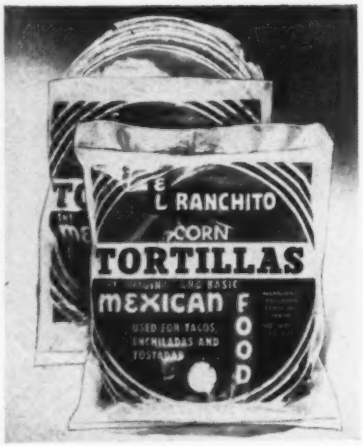
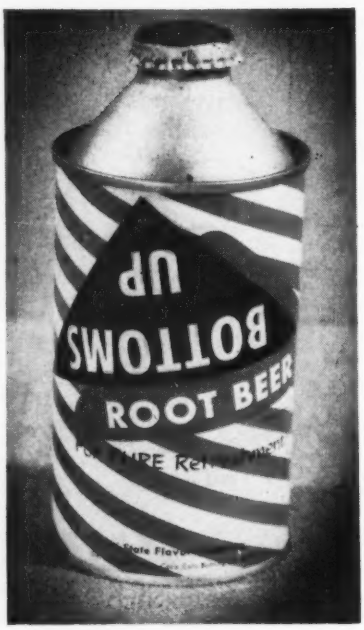


Handy Tortilla Pack

Fresh from the ovens of El Ranchito, Zillah, Wash. are ready-baked Mexican tortillas sealed in Transparent plastic bags. Made with corn flour and water, the tortillas are packed one dozen to a bag.

The wrap, a polyethylene "Showbag" designed by Central States Paper & Bag Co., St. Louis, is printed in red and blue. They keep the tortillas soft and fresh, and also allow freezing of the product.

For Package Data Use Reader Service Card



"Follow Directions on Can"

Legible only when the can is tilted to the lips is the unique trade name and label of Tri-State Flavor Co.'s entry in the canned soft drink market. The red and white striped crown-top can has high recognition value. The pop is processed in four flavors, orange, ginger ale, grape, and root beer.

Individual Salters

Another step in the "ready-to-use" field has been taken with the marketing of Morton Salt Co.'s "Morton Salters." Slightly over three inches high, the package is moisture-proof and foil wrapped. A plastic shaker top twists open to pour and provides dust-proof closing.

The "Salters" are the third in the Morton line. Also being marketed are the familiar large round package, and the Morton Miniatures for picnic use.

An attractive package, the container has a bright yellow top and blue foil wrapping. The Morton trademark, a girl with an umbrella, appears with the slogan, "When it rains it pours."

Three of the 4-oz. containers are packed in a snap-lock container overwrapped with cellophane. Both plain and iodized salt are available.

Foil Protects Tea

Heralded by Standard Brands Inc. as "the greatest improvement in tea packaging since the invention of the tea bag" is Tender Leaf Tea's new aluminum foil wrap. The seal-tight wrap protects the tea against staleness and foreign odors, as well as adding sales appeal.

All of the Tender Leaf line will be wrapped in the foil, with complete distribution concluded by this Fall.

Dried Cream Product

Requiring no mixing and designed for use at home or on picnics is Sanna Dairies, Inc.'s "Sprinkle." For use in coffee, tea, or cocoa, the product contains 27% butterfat. Ingredients are dried cream, skim milk, lactose and sodium hextametaphosphate.

The 4-oz. jar is protected by a screw cap by Crown Cork and Seal, Baltimore, while a Celon band encircles the jar and the skirt of the cap to provide both label and secondary seal.

For Package Data Use Reader Service Card

Wine in a Can

Added to the wide variety of beverages marketed in cans is a New York concord grape wine processed by Imperial Wine Co., Hartford, Conn. The canned wine is the result of extensive testing by the winery and can's manufacturer, Continental Can Co.

Using the "Mother Goldstein" label, the wine is packaged in 1-qt. crown-top cans. Blue, it is printed with a blue and gold label.

New Product Shorts

New Canned Juice

Minute Maid Corp., is adding concentrated pineapple juice in 6-oz. cans to its line of fruit juices.

Schweppes Sweeps States

Pepsi-Cola Co. will market Schweppes Ginger Ale in the U. S., the third product by the British company to be handled by the New York bottler.

Retails Own Brand

Frozen peas bearing the "Kitchen Garden" label are the first of Grand Union Co.'s private label frozen foods. Green beans, broccoli, and spinach will also be added.

Packaged Lemonade

Lemonade Mix is being processed by Wyler & Co., Chicago, in a laminated foil packet by Milprint, Milwaukee.

ANOTHER SALES WINNER

packaged by the Model FF-2

Shoppers know a good thing when they see it – and they buy it when the price is right. Swanson's TV Dinner, for example, looks mighty attractive on display. The neatly wrapped package tells a unique sales story – points up the quality of the product. And the fast, efficient manner in which the wrapper is applied by a "Package" Model FF-2 machine helps maintain a popular selling price.

What the Model FF-2 is doing for Swanson is typical of what "Package" FF wrapping machines are doing for frozen food packers throughout the country. These machines economically make outstanding wraps at high speed, with only one operator . . . Use many different types of wrapping material in roll form . . . And thanks to thoughtful design, can be set, adjusted and cleaned with a minimum of down time.

Model FF wraps a wide range of cartons at speeds to 100 a minute. Model FF-2, which is adjustable for larger sizes, has a speed of up to 75 a minute. The high-speed Model FF-H wraps standard-sized packages at speeds to 160 a minute.

Find out what these machines can do for *you* – write us for complete information.

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the steam trap that gets equipment *hot in a hurry and keeps it hot.* Small size, light weight, *body and all working parts of stainless steel.* Low cost, low maintenance.

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YARWAY ENGINEERING SERVICE . . .
32 trained YARWAY engineers working out of YARWAY branch offices from coast-to-coast, are constantly helping on *trap selection, installation maintenance* and *operation.* Solving your trap problems is their job. It will cost you nothing to call them in to assist you.

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YARWAY

impulse steam traps

And Yarway Fine Screen Strainers

Converts Locker Plant

—Continued from page 63

After the pies are frozen, they are packaged in waxed cartons, then overwrapped in printed waxed labels. These materials are easy to handle, and it has been found that they give adequate protection against dehydration during the customary shelf-life.

Pre-cooked dinners are placed on divided aluminum trays and are covered with aluminum foil before freezing, which largely prevents loss of moisture from the dinners while they are in the oven, yet permits escape of steam, since the crimped edge is not hermetically sealed. They are then placed in waxed cartons and are wrapped in printed waxed labels.

The freezer room is somewhat unusual. Overhead plate coils, with a total rating of 4,500 Btu./deg. F./hr., are connected to a 25 hp., 4 cylinder, single-stage Freon compressor (discharging into a shell and tube condenser, with associated cooling tower). The coils themselves weigh approximately 7,500 lb., and the latent freezer capacity is fully utilized by operating the compressor during off-periods to bring plates and room to −30 deg. F.

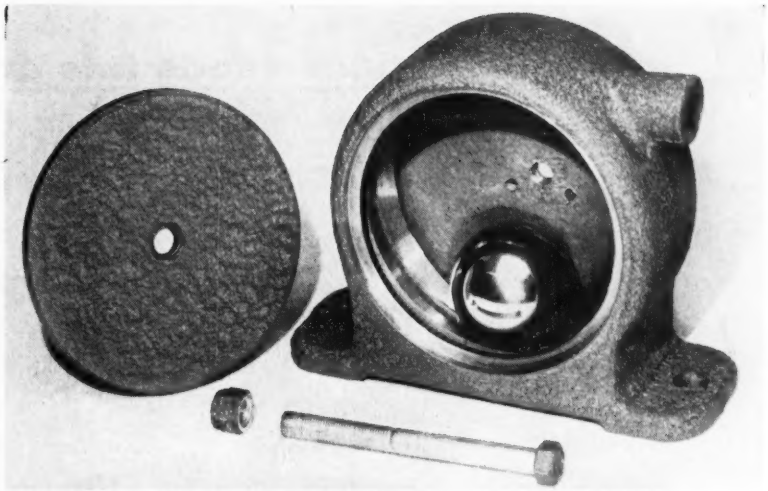
Since gravity air circulation would be unsatisfactory for blast freezing, air is forced through the plates at a velocity of 100 fpm. and is circulated about the product to be frozen. Plant operation requires that the product be reduced to 0 F. within 3 hr. As the peak load is approached in mid-afternoon, it is possible to draw on the "refrigeration reserve" stored in the overhead plates, giving a cushion of approximately 70,000 Btu.'s per hr. for the last 3 hr. of the day.

Since this is equivalent to about 15 hp. of additional capacity of −20 deg., the operators are convinced that the plate coils have leveled out the peak load at very little added expense.

The 0 F. holding room is refrigerated by two 10 hp. Freon compressors. The cut-in and cut-out points of the two units are set at different values, so that one of them carries the load most of the time, the other one cutting in only when required. These compressors discharge into individual circuits in an evaporating condenser. A third circuit in this condenser takes care of the 5 hp. unit previously mentioned.

The company distributes products under its own label in the adjacent metropolitan Cincinnati market. Products made under private label are marketed throughout the country, depending on the area served by the co-packer.

End (*Resume reading on page 64*)



NEW AIROVIBER MOVES BULK MATERIALS QUICKLY, QUIETLY, AND EFFECTIVELY...

AiroViber simple design provides dependable, trouble-free vibration

This new method of external vibration can be used to good advantage in loading, unloading, moving, packaging, processing, grading or separating bulk materials.

The AiroViber is able to deliver effective and dependable vibration with only one moving part, a heavy steel ball running on a circular track. The pounding usually associated with the ordinary types of vibration has been eliminated with the special noise lessening design, exclusive with AiroViber.

Simplified Design

AiroViber's one moving part is a steel ball. An air jet blows it at high speed around a ground and hardened steel track in the housing. The weight of the ball develops a strong centrifugal force, which the vibrator transmits through its mounting into the object to be vibrated. It will start and operate under any condition and performs at high or low temperatures. AiroViber is not affected by humidity.

Trouble-Free Operation

The AiroViber is almost fool proof in operation. Because it has no close fitting parts to lubricate or adjust, it will start every time you open the air valve. You can install it in hard to get at locations with full confidence that it will operate without lubrication or maintenance for a long time.

No Installation Problems

AiroViber is easy to install. It does not need any special line oilers or air filters. Merely hook up an air hose large enough to deliver the air specified for the unit you select.

AIROVIBER rotary vibration breaks up arching and jamming in bins, hoppers, chutes, feeders, and other places where bulk materials hang up. It is also recommended for vibrating tables or platforms, sorting and many other applications.

AiroViber is a product of Viber Company, leader in the field of vibration. For further information, write: Viber Company, 726 South Flower Street, FE-70, Burbank, Calif.

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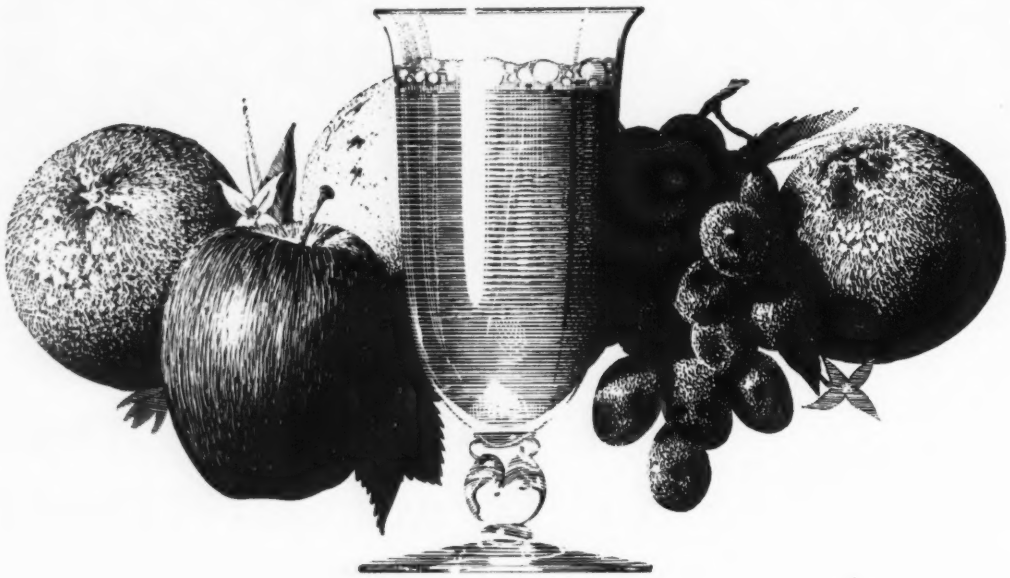

Did you know that ascorbic acid may be added to certain fruit and vegetable juices to standardize their vitamin C content, thus overcoming wide variations which can occur *(see table below)*. Many nutritionists believe that the public interest is best served when the ascorbic acid content of processed juices is so standardized. The cost is nominal, the processing simple. A label statement of 100% of the minimum daily adult requirement for essential vitamin C may be made when a serving of juice contains 30 mg. of ascorbic acid.

Why send your juice to market with the "handicap" of inadequate nutritional value? Use Roche ascorbic acid to standardize its vitamin C content. We have helped many processors to make their good foods better and we're ready to help you. Why not investigate today?

Ascorbic Acid Content of Canned Juices

Below are examples of minimum and maximum levels of ascorbic acid in commercially canned juices. Note the wide variations! All figures are in milligrams per 100 grams of juice. Data from U. S. Department of Agriculture.

	Min.	Max.
Grapefruit juice	10.0	49.0
Orange juice	9.7	70.0
Pineapple juice	5.4	18.0
Apple juice	0.2	3.6
Grape juice	0.0	4.7
Tomato juice	2.5	32.0

It is in the public interest to standardize the vitamin C content of these processed juices and juice products.

Orange — Grapefruit — Lemon — Tangerine — Apple
Grape — Pineapple — Cranberry — Tomato
Vegetable blends

No matter which type of processing you use—
Canning • Concentrating • Freezing • Dilution in the form of "ades"—your juice will be better when its ascorbic acid content is standardized.

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In Canada: Hoffmann-La Roche, Ltd., Montreal, Que.

ADVANCES IN TECHNOLOGY

Saturated Atmosphere In Cold Storage Rooms Prevents Burn of Frozen Poultry Products

Surface desiccation of frozen products does not occur if air in cold storage rooms is saturated with moisture, and it is retarded by high relative humidities.

Frozen poultry requires a relative humidity of 95% or higher, or serious freezer burn will occur in a few months. Reducing rate of moisture condensation, or direct humidification may be used to attain this high humidity.

For direct humidification, a system has been devised in which the moisture condensed by the cooling coils is washed from them by an ethylene glycol solution. Absorbed moisture is removed from the glycol by an evaporator and returned to the cold room, while concentrated glycol is returned to the spray system. Relative humidity in the room where this system was used, varied linearly with the amount of moisture returned to the room.

At 0 F., raising humidity of test room from 62 to 100% increased refrigeration load ⅓ and doubled power requirement of system. This is a comparatively large increase. Its importance will depend on value of proper humidity during storage of a product, and ratio of operating to total storage costs. Part of the increase is offset by the increased efficiency of frost-free evaporation in the cold room.

Digest from "Humidification of Cold Storages," by C. P. Lentz, *Canadian Journal of Technology*, 156-163, July 1954.

Storage of Oily Fish

In a study made to determine keeping quality of frozen oily fish, samples of 6 species were stored up to 270 days at 6-16 F. in commercial facility.

Test samples of pilchard, eulachon, herring and silver smelt were prepared by laying fish side by side, 2 layers deep, in rectangular aluminum pans with tight-fitting lids and subjecting to rapidly moving −20 F. air for 2½ hr. Pans were then immersed in 32 F. water to release frozen block of fish and, at the same time, provide protective ice glaze. Glazed blocks were packed loosely in fiberboard cases and stored at 6-16 F. Blocks were removed and reglazed each 90 days.

Albacore tuna and sablefish were wrapped tightly in single sheets of MSAT cellophane, frozen as above, then transferred to 5 lb., 2-piece, folded waxed cartons for storage.

Control samples were packed in ½ lb. flat cans, sealed under 15 in. vacuum, frozen as above, transferred to wooden boxes and placed in storage.

Organoleptic examinations were made immediately, and after 90, 180 and 270 days. For these examinations, samples were thawed in moving air, immersed in 6% salt solution for 5 min., drained and baked at 350 F.

Each species appeared to have its own storage characteristics. Block frozen pilchard became rancid and barely edible between 0 and 90 days; eulachon was definitely rancid after 180 days; albacore became slightly rancid between 0 and 90 days, yet did not change greatly up to 270 days. However, the meat darkened appreciably by end of 180 days. Sablefish discolored and became slightly rancid between 90 and 180 days; herring remained good for 180 days, showed darkening by 270 days, smelt stayed good for 180 days.

Of control samples, only tuna remained unchanged for 270 days; smelt declined to fair in 270 days, sablefish and herring changed from very good to good in 180 days, eulachon and pilchard became fair before 90 days.

Digest from "Freezing and Cold Storage of Pacific Northwest Fish and Shellfish. Part III —Storage Characteristics of Six Species of Oily Fish," by M. Heerdt, Jr., and M. E. Santsby, *Commercial Fisheries Review*, 1-5, June, 1954.

Spoilage of Eggs

Black light candling of shell eggs with a suitable ultraviolet source, can detect eggs infected by pigment-producing species of *Pseudomonas* in the earliest stages of the infection. Undetected, such eggs will eventually display brightly pigmented albumen and have bacterial counts in the millions.

Eggs that are only partly fluorescent do not have perceptible decomposition odors. When fully fluorescent (about 10-million bacteria per g.) storage develops decomposition odors detectable 70-90 percent of the time by taste panels, when the eggs are soft boiled.

Pseudomonads are soil and water organisms and get into the eggs after laying. Washing of dirty eggs tends to spread the infection and increases spoilage.

In experimental lots, eggs stored at 85-87% relative humidity were more rapidly infected by *Ps. ovalis* than fresh eggs. The presence of more than 1% of fluorescent eggs in a lot indicates dirty eggs, washed eggs or both.

Digest from "Spoilage of Shell Eggs by Pseudomonads," by R. P. Elliott, *Applied Microbiology*, Vol. 2, No. 3, 158-64, 1954.

SANITATION

Detection and Control Of Fish Spoilage

Fresh fish spoilage is due in large measure to bacteria in their digestive tracts and external slime, since it has been frequently demonstrated that their flesh and internal organs are sterile bacteriologically.

Fish muscle is about 80% water and percentage of soluble nitrogenous nutrients in which bacteria can flourish is high. Marine microorganisms associated with fish can grow at low temperatures and will thrive at 18.5-23.5 F. Their temperature coefficient of growth (Q10) is much greater at 25-41 F. than at higher temperatures.

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No complicated adjustments from size-to-size on a Hayssen. No gears or sprockets to remove or change . . . no need for expensive mechanics to change size, either. So simple the operator does it on the job.

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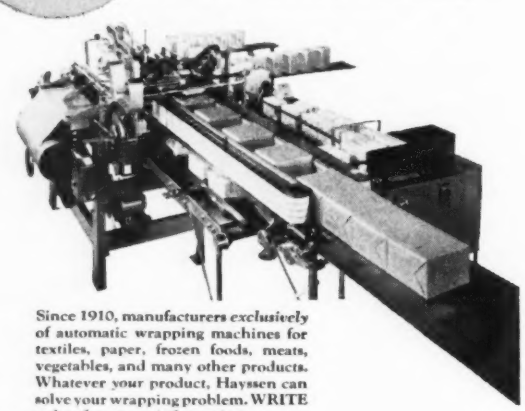
Hayssen's simple, rugged design, using fewer moving parts, keeps these machines working and saving through years of dependable, trouble-free service. Every moving part is in the open and easily reached for maintenance and cleaning.



Since 1910, manufacturers exclusively of automatic wrapping machines for textiles, paper, frozen foods, meats, vegetables, and many other products. Whatever your product, Hayssen can solve your wrapping problem. WRITE today for more information.

Hayssen MFG. COMPANY
Dept. FE-9, SHEBOYGAN, WISCONSIN

Fish spoils about twice as fast at 36.5 F. as it does at 30.2 F. and the best way of keeping it fresh is to store as close to freezing point of muscle (30 F.) as possible.

Presence of psychrophilic bacteria undoubtedly contributes to the more rapid spoilage in cold storage compared to beef, which has a higher proportion of mesophilic bacteria. Post motem pH of fish flesh is usually 6.0-6.6, higher than that of beef. As spoilage proceeds pH rises due to formation of volatile bases. Artificial lowering of pH to delay onset of spoilage has not been too successful since the isolelectric point of muscle proteins is only a little below 6.0.

Ultraviolet irradiation is insufficiently penetrating for effective sterilization, but ionizing radiation shows promise. Sodium chloride is the most effective salt for fish preservation but halophilic organisms keep it from being completely bacteriostatic. Nitrites are cheap and effective, and value of smoking as a preservative lies in the phenolic compounds it deposits in the fish flesh.

Determination of bacterial numbers, volatile bases, trimethylamine, total volatile substances, indole, as well as organoleptic tests may be applied to estimating degree of spoilage but all known tests require considerable judgment in interpreting them.

Digest from "Microbiological Deterioration of Fish Post Mortem, Its Detection and Control," by H. L. A. Tarr, *Bacteriological Reviews*, (132 references) March, 1954.

Hypochlorite Increases Detergent Efficiency

Laboratory apparatus set up to simulate conditions commonly met in recirculation cleaning of dairy equipment confirmed the value of the commercial practice of adding small amounts of hypochlorite to detergent solutions. The laboratory apparatus gave the desired control of solution temperature, detergent concentration, rate of flow, and cleaning time. Cleaning efficiency was tested by visual examination of strips of stainless steel on which had been deposited a film of synthetic milkstone.

A standard cleaning procedure was established and three alkaline cleaners were tested, representing types used for recirculation cleaning. Results indicated that addition of 25-100 ppm. sodium hypochlorite to an alkaline cleaner aids in the removal of milk solids deposit, probably due to the solubilizing action of the hypochlorite on the protein fraction of the soil. The possibility of corrosion of pumps, pipe lines, and other parts of the system should not be over-

looked, and in any event no more than the minimum hypochlorite should be used. Residual chlorine may remain in the system at the end of the cleaning cycle.

Digest from "Effect of Added Hypochlorite on Detergent Activity of Alkaline Solutions in Recirculation Cleaning," by D. R. MacGregor, P. R. Elliker, and G. A. Richardson, *Journal of Milk & Food Technology*, 136-38, May, 1954.

FRUITS & VEGETABLES

Drying Conserves Papaya

Papaya in dry-powder form that retains all of the values of tree-fresh fruit is prepared by a new process patent which was granted last year.

Fruit is readied for processing by washing, peeling, removal of seeds, and pulping. Pulp is heated to 106 F. for 2-hr. to peptonize protein matter, then to 123 F. to dissolve pectin, and finally to 140 F. to convert dextrins to maltose.

Following filtration, juice is concentrated to 40 deg. Be by boiling at 68-100 F., then dried on vacuum drum drier to form powder.

Digest from U. S. Patent 2,650,165, issued Aug. 25, 1953, on an application dated May 31, 1950, to Arnold S. Wahl, Chicago.

Dry Flowers Attached to Fruit Responsible for Soft Pickles

High mold populations built up in growing cucumber plants, particularly the flowers, are now believed responsible for softening of pickles during processing.

These flowers remain attached to the fruit and thus introduce the molds, that are a potent source of softening enzymes, into the brine.

Brining tests with cucumbers containing a high percentage of flowers resulted in soft salt pickling stock and brines with high enzyme activity.

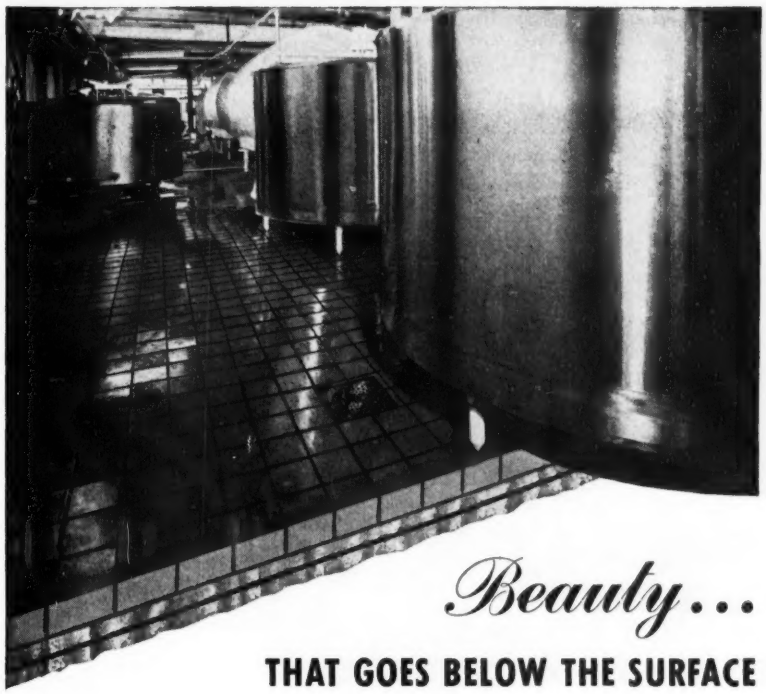
Tests with flower-free, thoroughly washed fruit, gave exceptionally firm cured stock and brine of low enzyme activity. Firm stock was also obtained by replacing original brine with fresh solution after 36 hr.

Digest from paper by J. L. Etchells, USDA Agr. Research Service, Raleigh, N. C., presented at annual IFT meeting, Los Angeles, June 29, 1954.

Malic Acid In Apples

After exposing mature McIntosh apples for 18 hr. in darkness to $C^{14}O_2$, the radioactive carbon was found in the malic acid of the apples as well as in the aspartic acid, glutamic acid, alanine, and serine of the nitrogenous fractions.

Malic acid is produced from CO_2 at about half the rate of the daily



Beauty...

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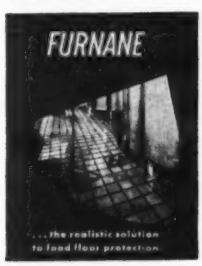
STEP ON IT . . . give it normal rough plant handling . . . let the most destructive food plant corrosives come in contact with your ATLAS FURNANE® FOOD PLANT FLOOR. Years later it will retain its original attractive appearance . . . without constant repointing . . . without costly maintenance.

ATLAS has solved the problem of combining both appearance and real service in a single floor. Solved the problem of getting flush and solid joints. Solved the problem of providing a floor with complete resistance to *all* food plant products and residues . . . with substantial physical strength.

ATLAS FURNANE FOOD PLANT FLOORS are a combined development . . . of materials, constructions and installation methods. They can be installed with *assurance* . . . a permanent investment that pays continuous returns in low maintenance costs.

Why continue to pour money into questionable floor construction? Write for complete information today.



New Booklet Available. Send for Bulletin 3-2.

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. . . the realistic solution to food floor protection.

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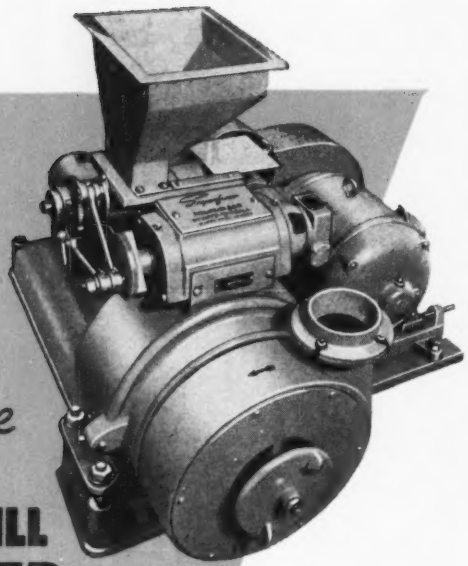

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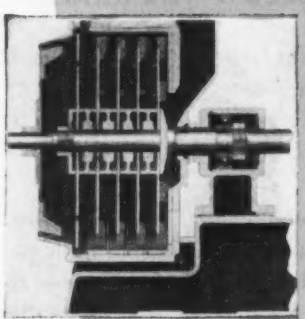

Cross section of the grinding chamber of our "Superfine" Pulverizer showing from left to right the cone plate, perforated mill plate and 4 beater plates with multi-section liner divided by annular rings.

Here is a disassembled mill. Every part separated and accessible—corrugated liners exposed for easy cleaning, exchange or replacement.

AIR FORCE PULVERIZING—AIR CLASSIFICATION

Here is a proven, automatic and dustless method of pulverizing any grindable material to your desired finess. For extremely fine grinding and uniform particle size distribution of product, the principle of centrifugal impact with air attrition utilized so efficiently by the Schutz-O'Neill "Superfine" Pulverizer has never been surpassed. The centrifugal force recirculates coarse particles within the mill for regrinding. The air classification carries the fine particles out of mill as uniform product of the desired particle size.

ADAPTABLE TO THE COMPLETE RANGE OF PULVERIZING FROM COARSE TO ULTRA FINE

The ease of grinding and the versatility of the unit are two features not found in any other pulverizer on the market. With proper adjustments, this mill will produce particles from 40 mesh to low micron sizes under conditions that enable you to accurately control not only particle size but also the size distribution in the product. This can be done while maintaining grinding temperatures below 125-130°F.

COMES APART IN 10 MINUTES, EASY TO CLEAN, ADJUST, REPAIR

Ten minutes is all you need to take apart a Schutz-O'Neill "Superfine" for cleaning, to adjust for fineness, or replace any part. Remove 2 pins and cone housing lifts off. Loosen 1 set screw and 1 nut and all other parts slide right off the center shaft. It is unmatched for accessibility and simple, rugged design.

LET SCHUTZ-O'NEILL GRIND A TEST SAMPLE FOR YOU

Send us a 50 lb. stock sample stating what your material is and fineness desired. You will receive your pulverized stock plus our engineering report giving complete details of process used together with recommended equipment, methods and mill plans.

WRITE US FOR THE NAME OF SCHUTZ-O'NEILL SALES ENGINEER NEAREST YOU.

ESTABLISHED 1893

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PULVERIZERS • GRANULATORS • ROLLER MILLS • AIR CLASSIFIERS SIFTERS • HAMMER MILLS

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net loss of the acid, the rate rising as the CO_2 concentration in the atmosphere around the apples increases.

About 10% of the total radioactivity taken up is found in the free amino acids, and a similar amount in the protein of the apple. About 8 mg. malic acid per 100g. of apple is produced per day. Prior to ripening and harvest the malic acid production is much less, but increases from 3-4 mg. daily to 8 mg. a day in an atmosphere containing 5% CO_2.

There is evidence that during storage the rate may reach 10 mg. daily per 100g. of apple. This would be a significant contribution to the acidity of ripening McIntosh apples which reaches a maximum of about 1g. per 100g. of apple.

Digest from "A ^{14}C Study of Carbon Dioxide Fixation in the Apple. I. The Distribution of Incorporated ^{14}C in the Detached Mcintosh Apple," by N. Allentoff, W. R. Phillips, and F. B. Johnston, *Journal of the Science of Food & Agriculture*, 231-33, May 1954, and "II. Rates of Carbon Dioxide Fixation in the Detached McIntosh Apple", *ibid.* 234-38.

BAKING

Survival of Spores In Bread Baking

That bacteria or their spores survive in baked bread is most strikingly shown by the occurrence of "ropy" bread.

A strain of *Bacillus subtilis* producing a specific kind of ropiness was used for systematic study of bacterial survival in baked breads. About 100,000 spores per g. were mixed in the dough which was then baked in pan bread. Thermocouples were inserted near the center of the loaf, near the crust, and midway between these points.

Internal loaf temperature did not exceed 212 F., and this was barely reached at the center of the loaf by the time baking was completed, 30 min. after placing pans in oven.

Vegetative cells of the bacteria were killed in buffer solutions in about 2 min. at 167 F. Spore deathtime curves were not exponential and some spores survived a long time.

Results in bread indicated heat resistance of spores in dough about the same as, and certainly not less than, their resistance in buffer solutions. Only a small proportion of the spores were able to generate patches of ropy bread in about a week.

Non-exponential behavior of cells in thermal deathtime tests, and fact that temperatures of 212 F. may be barely reached in center of a normally baked loaf of bread, can increase proportion of spores surviving. Heavy infections may therefore not be killed in normal baking times, even though

samples taken near the bread crust may show no viable spores. Vegetative cells are probably all killed by bread baking temperatures.

Digest from "The Survival of *Bacillus subtilis* spores in the Baking of Bread," by F. J. Farmiloe, S. J. Cornford, J. B. M. Coppock and M. Ingram, *Journal of the Science of Food & Agriculture*, 292-304, June 1954.

MAINTENANCE

Brewery Paint Problems

Mildew on painted surfaces is due to several types of mold-fungi, but is seldom the result of growth of *Aspergilli* or *Penicillia*.

Alternaria species are relatively frequent in growths on exterior painted surfaces, while interior walls such as those in brewery cellars are frequently attacked by species of *Phoma* and especially by *Pullularia pullulans*. Last named species produces characteristic gray or black dirty streaks on paint.

P. pullulans resembles yeast in some of its growth stages. It can be readily identified under a microscope with the paint specimen illuminated from above.

Conditions for mold growth in cellars are far from optimum, and mildew organisms must be able to grow at suboptimum temperatures, and to use the paint film as a source of nutrients supplemented by incidental deposits of dust and moisture. These unfavorable conditions are offset by the months or years during which organisms can grow. Eventually they disintegrate the paint film and expose the under surface to fresh attacks.

Surfaces subject to mildew or having it present should be prepared by wire-brushing with a detergent solution containing about 2000 ppm. available chlorine. Mildew-resistant paints are efficient and are obtained by adding metallo-organic compounds to the paint vehicle. Phenyl-mercurials are highly effective for the purpose. Copper quinolinolates are also good, but owing to their slightly greenish tinge they are not too compatible with white paints.

Digest of a paper "Mildew Attack of Paint", by M. Goll (Nuodex Products Co., Elizabeth, N. J.), presented at Convention of The American Society of Brewing Chemists, Milwaukee, May 13, 1954.

Descaling Sugar Evaporators

Scaling of evaporator tubes in cane sugar factories is a major problem, and periodic shut-downs for drastic de-scaling by boiling with caustic soda solution, brushing, and the use of rotary cutting tools are necessary.

Scale from an evaporator in a sugar factory in Trinidad, consisted chiefly

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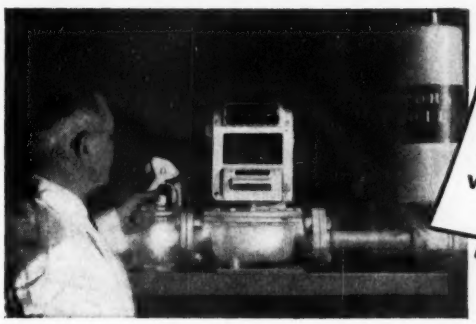
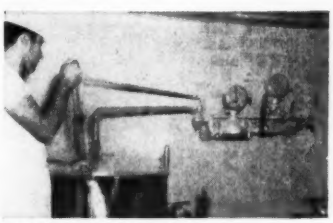


By eliminating human errors in blending expensive ingredients, this meter paid for itself in one month!

Speed batch mixing by putting a standard Auto-Stop meter in each liquid ingredient line. Gives you *accurate* quantity control . . . *automatically.*

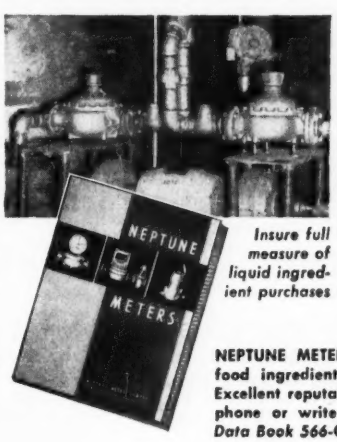


Small batches, from half a gallon to 20 gallons, are measured accurately with these two Neptune meters

Automatic control of pumps, valves, agitators, etc.: Simply rig Auto-Stop meters with electrical switches which are actuated when desired amount of liquid is delivered.

Eliminate losses due to rejected batches, spills and over-fills. Meters can't make "human" mistakes.

Eliminate unsanitary or hazardous conditions. Liquids stay inside the pipe all the way . . . no muss and fuss of gauge sticks, pails or batch tanks.



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Accurate inventory and cost control with less effort. All Neptune meters have totalizing counters to record consumption at every step in your process.

NEPTUNE METERS now handle more than 150 liquid chemicals and food ingredients. Sizes from 25 to 1000 gpm. Bronze construction. Excellent reputation for sustained accuracy and low maintenance. Telephone or write your nearest branch for full details. *Ask for Meter Data Book 566-Of.*

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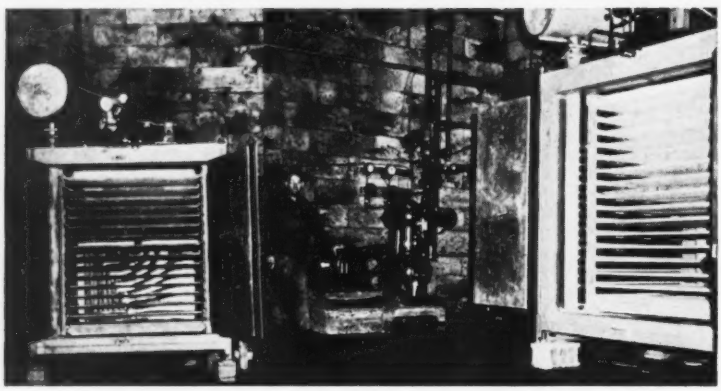

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Check every feature you desire in the processing of your frozen food packages. Then Check Amerio Specifications, and know why the AMERIO FREEZERS are best for you on every count—the First Choice of Leading Food Processors.

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of calcium sulphate with some silica. Since sodium ethylenediaminetetracetate (Versen) sequesters calcium and magnesium so completely that not even oxalate ions will precipitate them, such a solution should act as a solvent for the scale.

Laboratory experiments proved this to be the case, and plant trials also showed that Versene solutions removed the scale effectively, but larger amounts of it were necessary than laboratory experiments predicted. The increased quantity appears to be due to cleansing action on body of evaporator.

For thorough removal of the scale, 2 lb. Versene per lb. of scale must be used. In an evaporator producing 3 lb. of scale per 100 tons of cane ground, 6-lb. would be required. At 62c. lb this comes to 3.7c. per ton of cane, compared to 1.8c. for usual cleaning methods.

Cost might be less for succeeding cleanings. Or addition of Versene to the juice line from time to time might keep tubes clean.

Digest from "Descaling of Evaporator Heating Surfaces in Cane Sugar Factories", by N. O. Schmidt and L. F. Wiggins, *Industrial & Engineering Chemistry*, 867-70, May, 1954.

DAIRY

Crystallization of Lactose Effects Protein Stability

Coagulation of casein during storage of frozen concentrated milk is a direct consequence of crystallization of lactose in the milk according to experimental work on influence of lactose on stability of proteins in this product.

Studies included: (a) Measurement of protein flocculation in stored samples; (b) relationship between lactose hydrolysis and protein stability; (c) occurrence of lactose crystals; (d) stability of lactose-depleted milk in frozen storage; (e) influence of temperature on rate of lactose crystallization, and (f) the freezing curve of milk.

The mechanism by which lactose crystallization starts flocculation of casein is not clear. It is suggested that soluble lactose in the metacryotic fluid of partly frozen milk may sequester concentrated calcium salts and thereby moderate their destabilizing influence on the colloidal casein. Withdrawal of soluble lactose from unfrozen phase by crystallization would eliminate it as a stabilizing factor and permit casein to flocculate.

Other conclusions reached in the experiments: (1) Lactose crystallization and flocculation of casein in frozen milk occur in close sequence after well defined induction periods that are re-

lated to the freezing temperature; (2) about 75% of the water is frozen in 27%-solids skimmilk at 15 deg. F. Residual unfrozen phase is highly saturated with lactose which crystallizes rapidly after a characteristic induction period. At temperatures low enough to freeze 90% of the water, amorphous lactose phase is stable against crystallization, and flocculation of the casein is suppressed, and (3) enzymatic hydrolysis of lactose in concentrated milk stabilizes the frozen product by retarding rate of crystallization of lactose in proportion to the degree of hydrolysis.

Digest from "The Effect of Lactose Crystallization on Protein Stability in Frozen Concentrated Milk," by L. Tumerman, H. Fram, and K. W. Cornely, *Journal of Dairy Science*, Vol. 37, 830-39, July, 1954.

BEVERAGES

Special Belgian Beer

Lambic beer is peculiar to the region within about 15 kilometers of Brussels, Belgium, where it is produced only from mid-October to mid-May. Brewing practices employed seem to violate all principles of lager beer brewing, yet variations of them have never led to a beverage of true lambic character.

Malt and wheat are the raw materials in 60:40 ratio. Hops must be old Alost or Poperinghes that have lost all their bitterness by aging. They are used at the rate of 2.5% of the cereal weight of the mash.

Mashing is normal except for sparging which is done with water at 95 C. so as to get a wort high in soluble starch. Such worts give a blue-black iodine reaction. Sparging with 75 C. water yields a faster fermenting wort but resulting beer lacks the true lambic quality.

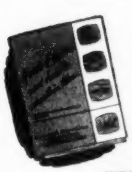
Worts are boiled for a very long time, then cooled in an open fermenting cellar where they become spontaneously inoculated with a mixed flora. Organisms required seem to be peculiar to the region, and consist of several yeasts and bacteria. Actual fermentation takes place in small casks. After a few days, casks are bunged and fermentation and curing goes on for 1-2 years before the beers are tasted, blended, and either bottled or sold in barrels and kegs.

Blended and sweetened with sugar, the product is known as "faro"; unblended and sweetened as "lambic doux". Dry unblended lambic is known as "gueuze" and is sold either in kegs uncarbonated ("gueuze tonneau") or bottled ("gueuze en bouteille").

Whether you have a new concrete floor or are refinishing an old one, the Multi-Clean Method is fast and economical. It fortifies concrete against abrasion and the devastating effects of excessive water, grease, oils, alkali, soaps and other chemicals. It prevents concrete dusting, pitting and chipping . . . gives you a hardened, completely sealed floor in a wide range of permanent non-fading colors and natural. You'll get better service and greater safety with added beauty and longer life from your concrete flooring when you use The Multi-Clean Method.

MULTI-CLEAN cuts hours off maintenance time!

The Multi-Clean Method saves many hours of floor maintenance time. Sweeping is easier, more effective and wet moppings become less frequent. Periodic steel wool buffing loosens stubborn dirt and restores the finish.



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Every floor care problem is answered in this 44-page handbook, packed with valuable information about floors and how to maintain them for lasting results and at lower costs.

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Gentlemen: I would like this handbook and information on: ☐ Floor Machine; ☐ Floor Scrubber; ☐ Vacuum Cleaner. I'm interested in The Multi-Clean Method for: ☐ Concrete Floors; .....Floors.

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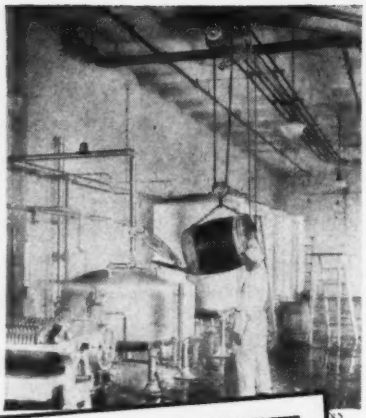
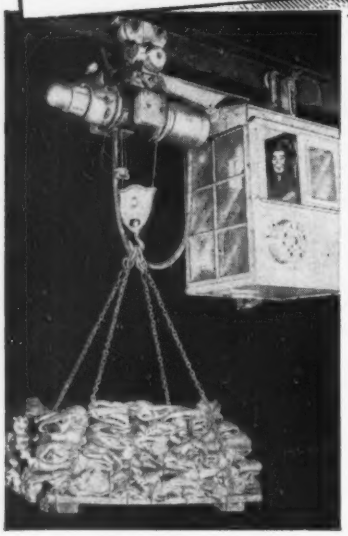
Floor-Operated Hoist

Operator mainly occupied with other duties. Hoist used for fast, efficient handling of relatively short hauls.



WHICH HOIST is RIGHT FOR YOUR JOB?



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Cab-Operated Hoist

Operator in cab moves loads along at high speeds—occupies best vantage point for spotting or stacking materials.

Choosing the hoist that's right for your job calls for expert advice.

Let the Shepard Niles representative in your area guide you in your choice. He specializes in through-the-air handling—knows which type of hoist will best fit your job.

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Bottled lambic requires about a year for finishing, the process being similar to that for champagne. Beverage is high in acidity (one g. as lactic per 100 ml.) and alcohol (6 to 8%). Volatile acidity may reach 0.2% though acetic flavored lambies are considered defective. The flavor varies from definitely lactic to a completely mellow product and much skill is required to produce well balanced blends.

Digest from "Lambic Beer," by Albert Vossen, *Brasserie et Malterie de Belgique*, Volume 4, No. 1, 2-7, Jan. 1954 (in French).

CONTROL METHODS

Fluoride by Colorimetry

Increasing practice of fluoridizing community water supplies has emphasized need for a simple, rapid, colorimetric method for determining the fluoride ion.

Based on bleaching effect of fluoride ion in colorimetric method for determining iron (III) in acid solution, a study was made to see if any of 18 organoferric colored complexes were sensitive enough to be satisfactory.

Three proved acceptable: Resorcylaldoxime; 5-phenylsalicylic acid, and resacetophenone, but the first was not sufficiently stable on standing an appreciable period of time. The other two gave reproducible and sensitive results from fluoride in concentrations from 0.0-6.0 ppm.

Investigation of the effect of the presence of 13 foreign ions showed that those forming stable complexes with iron, such as citrate and tartrate, and also a high concentration of aluminum, interfered with the determination.

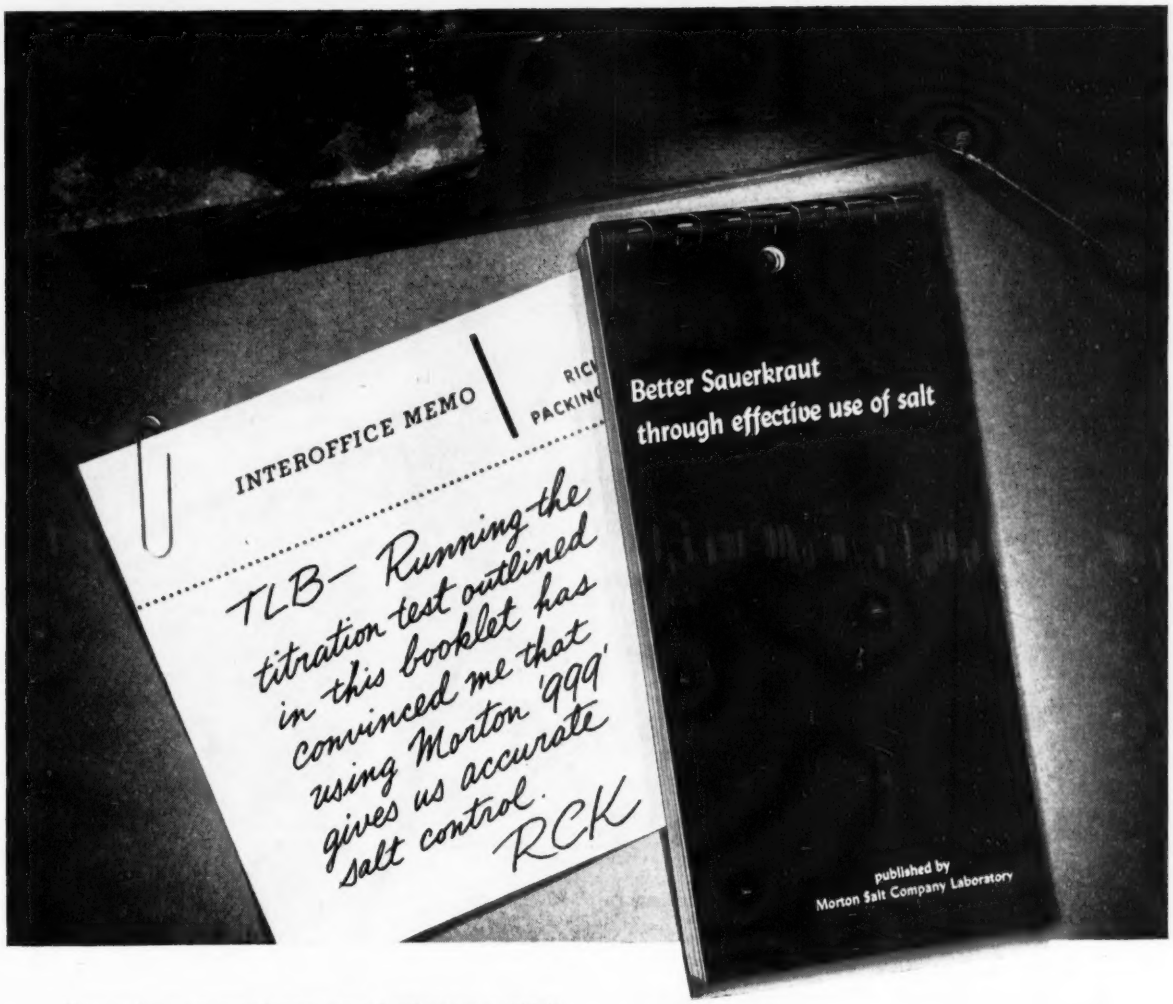
Digest from "Colorimetric Determination of Fluoride," by M. L. Nichols and A. C. Condo, Jr., *Analytical Chemistry*, Vol. 26, 703-07, April, 1954.

Mechanical Movers

—*Continued from page 61*

piling, and handling in the shipping room. Packing and shipping rooms were cluttered and congested with the hand-trucks. And repeated handling of packages resulted in considerable breakage, both of containers and of the packed cookies and biscuits.

The new system has linked all package-handling operations in the packing room and by means of spiral chutes provided a direct, continuous flow of packed goods to the shipping room, where roller conveyors feed packages to shipping tables.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Sauerkraut packers need Morton '999' Salt to prevent quality variations. So do makers and processors of candy . . . beer . . . canned foods . . . cereals . . . pasta products . . . seasonings . . . meat . . . malted milk . . . mayonnaise . . . margarine . . . olives.

MORTON '999' SALT insures uniform quality

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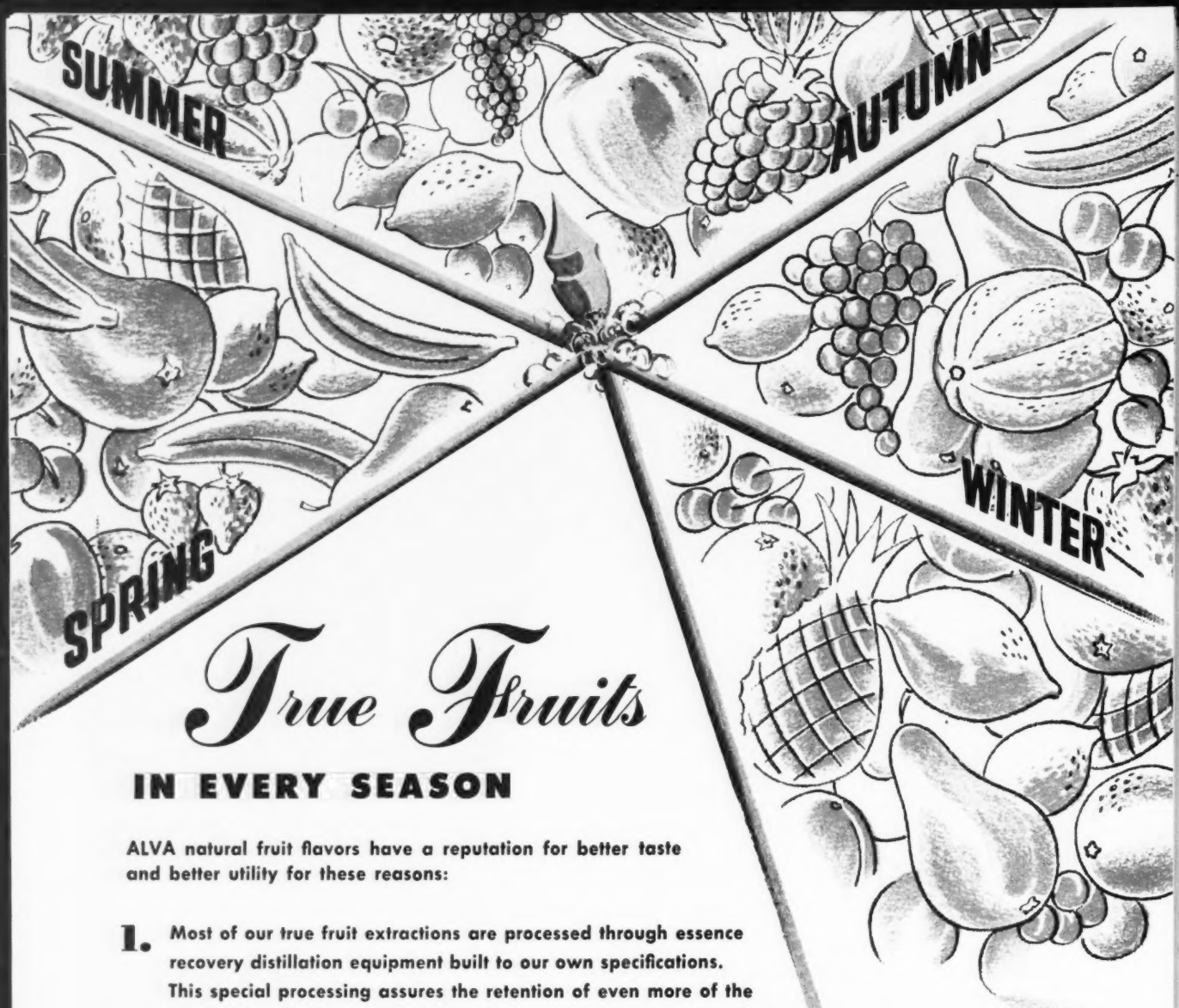

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2. **Storage facilities are maintained under ideal control conditions, improving the life of flavors and guaranteeing freshness in each delivery.**

3. **Through the years ALVA has developed procedures for handling fresh fruit which assure 100% purity.**

ALVA true fruit flavors are ideal for every use, and the ALVA laboratories are eager to help with recommendations and samples for every true fruit problem.

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Alva FLAVORS

Today, manual handling is reduced to a minimum, clutter and congestion are eliminated, and there is very little breakage of packages or their contents.

The system utilizes only about one-third of the floor area for all the handling, as compared with the previous method enploying hand-trucks and freight elevator.

Speed Controlled

Two spiral chutes, with three self-contained separate chutes, handle various sizes of kraft wrapped shipping containers and provide a continuous flow of packages from the fourth floor packing room to the shipping floor.

Packages move down the chutes at a safe speed predetermined by careful pitch specifications when building the sliding surfaces. And they are delivered without breakage to the shipping room, three floors below.

Packing operations include work in the "cold" room, where enrobed cookies are gathered and packed, and also in the normal-temperature room, where other types of cookies and biscuits are packaged.

In the cold room, operations begin with the forming of trays and other items at a central station. These are brought to the packing table on conveyors. Belt conveyors alongside the gathering and packing table convey the filled trays to wrapping machines, from whence they are carried on roller conveyor to the spiral chutes for dispatch to the shipping room.

Putting in a conveyor system at this point eliminated the previous double handling of trays and cartons to and from the packaging area.

Wheels and Belts Used

In the biscuit and regular-cookie packing room, wheel and belt conveyors provide direct handling between multiple wrapping and packing machines. Wrapped packages are conveyed right from the machines to the spiral chutes and delivered to the shipping room. The conveyor system abolished use of hand-trucks for finished goods on this packing floor.

On the first, or shipping floor, the spiral chute, containing its separate chutes from three different levels, discharges directly onto three different roller conveyors. Packages are taken from the roller-conveyor discharge tables and then stacked or placed on hand-trucks for delivery to shipping docks.

The conveyor installation has mechanized many former time-consuming manual handling operations and it is expected to return its cost many times over in man-hours saved.

End (Resume reading on page 62)

WHEN YOU PACKAGE WITH THE *Campbell* WRAPPER!

Now — you can cut labor costs to the bone and still greatly *increase* packaging production. This machine wraps at average speeds of *180 units per minute* (some products — 300) *Automatically!* — permitting one person, in many cases, to tend and operate several machines simultaneously. You save on materials, too, as boards, stiffeners and trays need only be used *as desired*. Exclusive "Float" wrapping is the answer. Packages are neat and square cornered with pre-printed wrappers of any modern packaging material, perfectly positioned. Various types of automatic feeds, sealing and delivery may be employed. Product shape or type — brittle, soft, fragile or solid — present no problem, nor do *number* of products per single unit. Send us your product. We'll be glad to tell you how we can *improve* and *speed-up* its packaging with really effective savings

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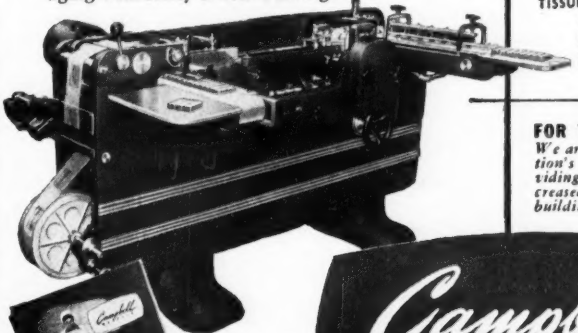

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Questions & Answers

THIS MONTH'S PROBLEM

Smoke Gets in Their Eyes

Question—Our smokehouse is along one side of the sausage-processing room. Every time the smokehouse doors are opened, smoke pours in. When this happens, personnel must stop work and leave, only to return and commence operations when the room becomes smoke-free. Do you know of anything that can be done to overcome this situation?

JULY PROBLEM

Measuring Viscous Product

Question—In mixing one of our products in large batches, we use several hundred pounds of a viscous ingredient that is withdrawn, as needed, from large holding tanks. This ingredient is so heavy in consistency that it cannot readily be metered by the available sanitary or easily-cleaned, displacement-type meters, with which we are familiar. We are forced to gage the product out of large holding tanks, using calibrated marking, but we know this method is not accurate. We would like to find a better way of measuring out this ingredient, and would prefer a weight method if possible to compensate for differences in specific gravity.

Answer—We suggest that you consider a relatively new development in the field of weighing. Although we do not know of many applications as yet in the food field, we believe that the principle of "load-cell" weighing of your large storage tanks would meet your requirements admirably.

In this weighing method, tanks must be mounted so that their weight is entirely supported by "load cells", mounted under the tank legs or supporting flanges. These cells carry so-called strain gages—tiny wires bonded to the load carrying members so that differences in weight of the tanks will cause minute differences in their dimensions and, therefore, in their electrical resistance.

These electrical property variations, with changes in weight, can be amplified and indicated or recorded by recognized methods and instruments. Thus it will be possible, with the aid of instrument companies, to set up a system which will indicate tank weights on an instrument dial or chart, and show the exact weight changes as material is withdrawn from the tanks for process use.

One advantage of such a system is that it takes up practically no space. This is in contrast to scale mounting of large tanks. Another advantage is its quick response, which provides a high degree of accuracy. There are no sanitation or cleaning problems, as there almost inevitably would be in trying to meter such a material.

Differences in specific gravity of product that may be encountered do not effect the accuracy of measurement.—*Editors.*

Bottling Marshmallow

Question—How can I bottle marshmallow sauces on a small scale, and what points must I watch to ensure reasonable shelf-life for a quality product?

Answer—We assume that you have access to a suitable formula giving correct proportions of corn syrup, cane sugar, egg white, and vanilla flavoring, and that you are chiefly interested in the equipment and process.

Any necessary heating of syrup (or concentrating of liquid sugar if this ingredient is chosen to furnish the cane sugar) can be carried out in conventional steam-jacketed kettles. If temperature controllers or recorders cannot be justified by the extent of the operation, a simple hand thermometer can be used for the guidance of the operator.

Beating of the mix, including egg white and flavor, can be done in a batch-type mixer with removable bowls. If desired, the formula amounts of ingredients can be measured into one bowl while another is being beaten. A vertical, top-driven mixer of the type used in bakeries should prove satisfactory. These can be fitted with a cage type of beater to give a whipping action. Some manufacturers use a timer to control the beater operation.

Production of a uniform product, regardless of weather conditions, is possible if mixing-and jar-filling areas are air-conditioned for temperature and humidity control, and kept under slight positive air pressure to prevent air infiltration. Obviously, this adds considerably to the cost of installation and may not be justifiable for the scale of operations you have in mind.

Of still greater importance from the standpoint of quality control and satisfactory shelf-life are the sterility of product and container. The glass containers may be sterilized immediately before use with either heat or radiation.

Maintenance of sanitary production and filling conditions also aids greatly, and this in turn calls for well-designed and easily-cleaned equipment and surroundings. We would suggest use of dairy-type sanitary pipe and fittings, which can be readily dismantled for thorough cleaning. Floors of tile, and smooth walls and ceilings with fungicidal paint, are both very desirable.

For further shelf-life protection, you will probably want to mark all containers very plainly "Store in cool place" and use a system of code-dating to permit proper stock rotation.

Wishes to Make Rye Bread

Question—Do you have a formula for making American-style rye bread by the straight-dough method? And can you tell me how to prepare the sour?

Answer—As for the formula, use: First clear flour, 345 lb.; straight rye flour, 125 lb.; milk solids, 29 lb.; water, 325 lb.; diastatic malt, 7½ lb.; salt, 12½ lb.; yeast, 7½ lb.; and prepared sour, 35 lb.

To make the sour, simply mix: Light rye flour, 5 lb.; water, 5 lb.; yeast, 5 oz.; and milk solids, 25 oz. Allow batch to stand in 80-deg. F. room for about 18 hr.

On Shrimp-Cocktail Sauce

Question—Can you furnish me with a formula and directions for glass-packing shrimp in cocktail sauce? How long will this product keep under refrigeration?

Answer—Fill into 4 oz. jars, 1½ oz. of cooked, peeled, deveined shrimp. Small shrimp are preferred. However, if large ones are used, cut each up into two or three pieces, depending upon size. Pour cocktail sauce over shrimp, and seal jars with screw cap.

Following sauce formula will serve as a guide, and you can alter it to suit

How Would *You* Do It?

Readers are invited to submit to FOOD ENGINEERING answers to questions to "This Month's Problem." Selected answers will be published, with credit (unless you specify otherwise). We pay space rates.

What is *Your* Problem?

Subscribers also are invited to send in food engineering questions. We undertake to provide answers, free, to the best of our ability. We do not undertake costly investigations. Give full information and your name. Your identity will not be disclosed.

Write to Questions & Answers Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.

the taste of your particular trade:

Tomato catsup, 3 gal.; ground horseradish, 2 gal.; Worcestershire sauce, 1 gal.; lemon juice, 1 gal.; red pepper sauce, 2 pt.; and salt to taste.

When held at about 34 deg., F., this product should keep at least a month.

We've been advised that heat-processed shrimp-cocktail sauce is inferior to the fresh product. Processing at temperatures about 212 deg. F. results in carmelization of sauce and toughening of the shrimp meats.

Making Mock Chicken Loaf

Question — We operate a small meat- and poultry-processing plant, from which we salvage about 200 lb. of chicken fat weekly. Can you suggest a formula for manufacturing chicken soup base in paste form to be used in the preparation of mock chicken loaf?

Answer—To prepare a chicken seasoning paste, mix thoroughly, but not too long, 25 lb. of chicken fat with 75 lb. of chicken soup-base seasoning that includes onion, pepper, salt, and celery.

Now to make the mock chicken loaf: Clean 60 lb. of tripe (hog and beef), boil slowly for 2½ hr., and then reclean. Cook in steam-jacketed kettle, until tender, the tripe, 10 lb. of hog lips, 15 lb. of veal trimmings, 15 lb. of pork cheeks, and 40 lb. of water. (Veal and cheeks must be cured by soaking in 170 deg. F. pickling solution, until sufficiently red.)

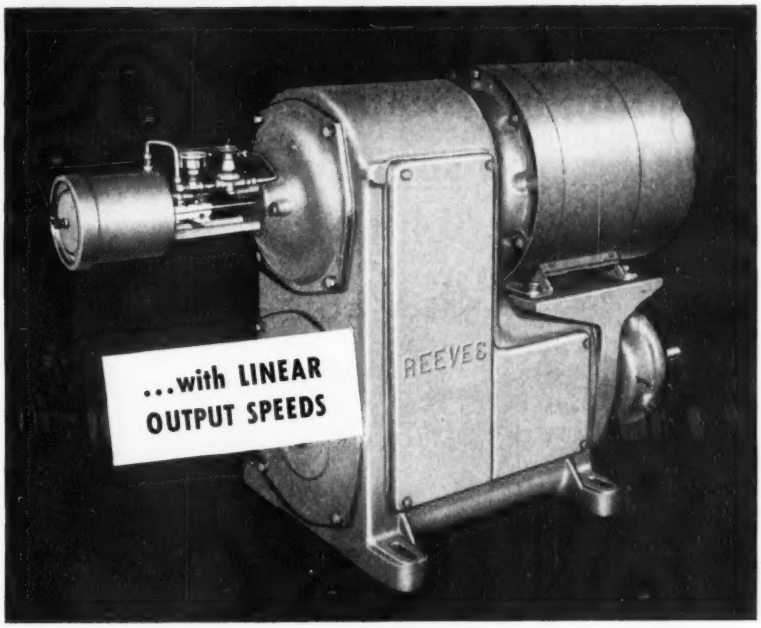
Cut or chop meats into small pieces (½-1 in.). Then thoroughly mix with vinegar (90 grain), 8 oz.; chicken-seasoning paste, 25 lb.; and salt, 1 lb. Place 3 parts of meat mix in metal forms, cover with one part of gelatin solution, and immediately and thoroughly chill. Once chilled, handle gently and keep cool.

Pickling solution for curing veal and pork cheeks consists of: water, 10 gal.; salt, 10 lb.; sodium nitrite, 1 oz.; and sodium nitrate, ½ oz.

Q.—Are you familiar with a method of determining the firmness of processed apple slices?

A.—Researchers at Cornell University have come up with a new technique—measuring the bulk density or the weight of slices in a given volume. Bulk-density measurements correlate with pressure-test readings of the raw fruit. And decline of firmness of fruit during several months' cold storage is readily shown by either method.

New Automatic Speed Control for Continuous Processing



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Gelatin solution is prepared by pouring 5 gal. of water into a container, into which is sifted (with no mixing) 5 lb. of gelatin. After soaking gelatin for ½ hr., solution is heated to 160 deg. F.

Crystallizing Fruits

Question—Can you furnish me with specific directions for making crystallized fruits—pineapple, prune, peach, and the like?

Answer—Drain canned fruit over wire-mesh screens, and then introduce into steam-jacketed kettle with sufficient water to cover. Slowly boil until fruit rises to top. Again drain fruit, and then cool in kettle by running cold water in.

Now place fruit in 15 gal. crocks, and add 26-28 deg. Baume syrup (hot and containing 100% sucrose). Initial concentration of syrup depends upon texture of fruit. If fruit is soft, start with the higher concentration syrup (28 deg.).

Next day, slightly simmer fruit and syrup in kettle. Following day drain syrup from fruit. Then return syrup to kettle and add enough sugar to raise Baume additional 2 degrees. Introduce fruit and syrup into crocks. Then next day return to kettle, simmer, and drain syrup.

Repeat process in this manner by raising sugar 2 degrees, and until 36 degrees is reached. Fruit is then in finished crystallized form.

Making Apple Butter

Question—Can you furnish me directions for manufacturing a small batch—about 200 gal.—of old fashion apple butter?

Answer—Into a 300 gal. stainless steel kettle with steam coils add 1,000 lb. of ground apples that have been previously washed and trimmed. Cover apples with water, and cook to a ketchup-like consistency.

Now introduce into batch: Sugar, 260 lb.; apple sauce, 85 lb.; and cider, 24 gal. Continue cooking, but slowly, to desired color (about 4 hr.). Turn off steam and hold batch in kettle until following day to develop a choco-

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Q.—Can you furnish me instructions on making Roquefort cheese dressing?

A.—Blend a mix of 1-2 lb. of finely crushed Roquefort cheese and ½-½ oz. of Worchestershire sauce with ½-1 gal. of French dressing (FE.—Jan. '54., p. 218).

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late-brown color. Run batch through pulper (screw-type), with 0.052-in. dia. screens to remove seeds, skins, and core pieces.

From finisher, pump batch into steam-jacketed kettle. Then introduce a spice-mix solution consisting of ground cinnamon, 30 oz.; ground cloves, 6½ oz.; and ground allspice, 6½ oz. in ½ gal. of water. Finally, cook batch to soluble solids reading of 44%, and fill hot (180 deg. F.) into jars.

Wants to Make Brownies

Question—Are you in a position to provide me with complete directions for preparing top-quality brownies with nuts?

Answer—Blend, until smooth, in a beater-type mixer: Sugar, 2¾ lb.; shortening, 2 lb.; cocoa powder, 9 oz.; and salt, 1 oz. To this add, ¾ qt. of whole eggs, and mix the batch until smooth. Now introduce and mix 2¾ lb. of flour (pastry type), 1 lb. of nuts (ready-diced-and-roasted pecans, walnuts, or almonds). Mix into batch, until smooth, ¾ qt. of honey. Pour into sheet pans, bake at 350 deg. F., cool, cover with chocolate fudge icing, and cut into 2 in. squares. If desired, top each square with whole almond, pecan, or walnut.

Excess Jar Breakage

Question—Recently, we effected a notable quality improvement in one of our glass-packed products by filling under a rather high vacuum. About the same time, we began to notice an increase in container breakage in shipment and handling. Could there possibly be any connection, and if so, what can we do about the excess breakage?

Answer—Your problem sounds very much like another case of what the container people refer to as "hydrodynamic" breakage. This perhaps best can be explained as a sort of "water hammer" effect.

If the product is free to move within the container during the normal vibration of shipping and the shocks of handling, warehousing, selecting, etc. —as it frequently will if there is a headspace and the product is fluid or semi-fluid—the bottom of the container may be struck a sufficiently hard blow to crack the glass. And the higher the vacuum within the sealed jar, the less cushioning effect of the headspace can one expect.

In some cases, this trouble has been eliminated for all practical purposes by the simple expedient of shipping

Photographed underwater at Weeki Wachee Spring, Florida

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5 reasons for using DAY "AC" (HERSEY TYPE) DUST FILTERS for efficient dust control

DAY Dust Filters are doing an outstanding job in a wide variety of applications. Here are five reasons why so many food processing companies use (and reorder) DAY Dust Filters.

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2. **Constant resistance resulting in constant air volumes.**
3. **High pressure reverse jet cleaning of filter tubes gives high air-to-cloth ratio. Minimum space required.**
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5. **No shut-down to clean. Constant, automatic operation.**

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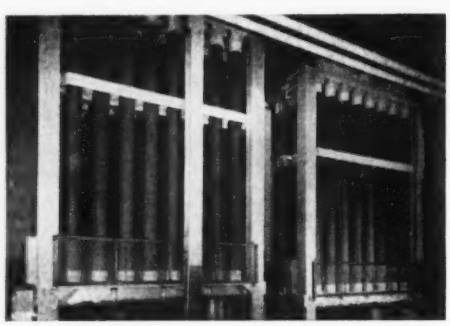
If you have a dust control problem, whether it involves a complete dust control system or a single unit, your inquiry is invited. WRITE FOR BULLETIN 528-R.



Two of the eleven DAY "AC" Dust Filters used by Pillsbury Mills, Inc., in their cake mix plant at Hamilton, Ohio. Space and headroom were at a premium, another reason why DAY Dust Control equipment was selected.

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the cases upside-down. Shocks are then absorbed by the closure. This is not a positive cure-all, of course, since some products may suffer adversely in appearance if held inverted for such a long time.

We recommend that you consult your suppliers of containers and closures. For in all probability their experience in similar cases also will be helpful to you.

Two Cookie Formulas

Question—Do you have formulas and directions for making ginger snaps and vanilla wafers? We are equipped with 60-qt. bowl mixers.

Answer—To make vanilla wafers, cream (but not too much) granulated sugar, 11¼ lb.; shortening (or a mixture of butter and shortening), 10½ lb.; and eggs, 2½ lb.

Now add to the batch, 10 lb. of flour and 1¼ lb. of vanilla. Beat to a smooth batter, and deposit on lightly greased and dusted pans. Then bake until sides of cookies are brown and center is light brown.

To make ginger snaps, mix granulated sugar, 7½ lb.; molasses, 6¼ lb.; shortening, 3¾ lb.; eggs, 3 lb.; ginger (ground), ½ lb.; and salt, 3 oz. Continue mixing and add 6 oz. of soda dissolved in 3 lb. of milk. Now add 15 lb. of flour and mix to smooth batter. Then form cookies with 2½-in. cutter, and steam-bake in oven.

Patching Up a Roof

Question—We have a built-up roof on one of our buildings that is not very old but is leaking in several spots. Examination shows that the leaks are attributed to blisters, loose seams, and cracks near the ridge. Could you suggest practical repair methods that will avoid the need for replacing this roof?

Answer—Blisters, such as you mention may contain water. So the first step is to clean the area. Then slit blisters with cross-wise knife cuts, and lay back loose felts. Any water present must be removed by dry mopping.

Next the under surface is coated with roofing cement, and the felts are laid back in place. A protective coating, trowelled or brushed over the area and re-enforced with roofing membrane, will complete this repair.

Loosened seams must be promptly treated, as they offer edges which may be caught by wind and result in more serious damage. Not only should these loose seams be re-cemented in place, but it is well to brush a roof preservative (penetrating compound) over the seam, lay 6 in. strips of reinforcing

membrane in this preservative, and complete the job with another layer of the preservative.

To treat the cracks, first point them with roofing cement applied by trowel. Membrane patches extending 3-4 in. beyond the breaks are then applied with a brushed-on liquid cement, and a second layer of membrane patches similarly applied over the first but extending 6 in. beyond the break will complete the job.

It might be well to point out that properly applied and maintained, built-up roofs sometimes last the life of a building. It might be well to call in a roofing specialist for a complete inspection and analysis of your trouble, so that further deterioration can be arrested. It is often possible to restore the roof to good condition by treating it with the right kind of penetrating preservative to re-saturate dried-out roofing felts.

Info on Suggestion System

Question — We are considering adopting a suggestion system for our employees. Can you provide us with some general suggestions for guidance in setting it up?

Answer—There are, of course, a great many successful suggestion systems in use throughout the country. Details vary according to size and complexity of the company. And as we do not know the circumstances in your particular case, it is necessary to answer your question in somewhat general terms.

A committee should be appointed to review and evaluate every suggestion submitted. Great care should be exercised in selecting the members of this committee. The individuals must be of unquestioned personal integrity, and represent a balanced cross-section of management—finance, production, engineering, laboratory, and personnel. This is necessary in order that each employee submitting a suggestion will have confidence that it will be fairly evaluated.

Next, it is important to set up a system of acknowledging each suggestion upon receipt, and indicating

---

Q.—We're modifying flour-storing facilities in our bakery. Helpful in this planning is information on the effects of temperature on insect breeding.

A.—Flour beetles don't lay eggs below 60 deg. F. Granery-weevil adults remain dormant at 35 F., and die when exposed at this temperature for a couple of weeks.

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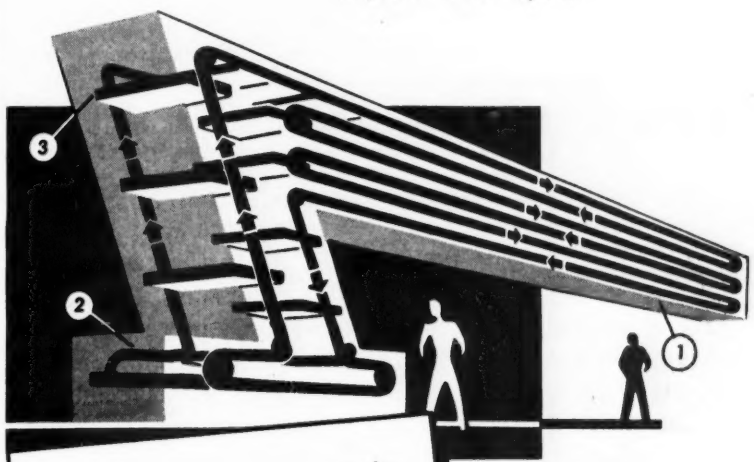

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about how long it will take to complete an evaluation.

One of the major purposes of a suggestion system, of course, is to build employee morale–and it will back-fire if the author of an idea hears nothing for weeks after offering it.

While a letter or acknowledgment form will serve this purpose, it may sometimes be desirable to include a personal interview at this time. This gives assurance that the idea is really going to be seriously considered, and it will also afford opportunity to clear up any ambiguities.

Evaluation of employee suggestions involves thorough study of their value in terms of cost reduction, better working conditions, improved product, broader market, or better public relations. In some cases, the money value will be easy to compute. But in others, there may be intangible benefits on which it will be difficult to place dollar-and-cents values. When the value is finally agreed upon by the committee, it may be advisable in these latter cases to explain the evaluation carefully to the author of the idea in terms which he will be able to grasp.

Following the evaluation comes the award. It should be made as promptly as possible, in accordance with a prearranged formula which splits the benefits between employee and employer in some equitable manner (but not necessarily on a 50-50 basis).

The formula itself must be left up to the individual company–the main thing is for it to be public information and simple enough so that no one will have reason to believe he is getting less than his fair reward.

It would seem desirable to give a larger *proportionate* reward to those employees whose normal duties do not *require* them to make innovations than to those (like engineers and technicians) who are expected to.

Finally, there is the important point of giving due publicity and recognition to the successful originators of worthwhile ideas. This is hardly sufficient reward alone, but it adds greatly to the morale of the winners when coupled with the cash awards. Bulletin boards, house organs, and even local newspapers can be used for this purpose.

Re Custard-Pie Filling

Question—Can your furnish us with directions for a good quality coconut custard filling—one that will not form a pasty sediment on the bottom of pies? We'd like to work with a 25-lb. batch.

Answer—Weigh out 8 lb. of milk and suspend 4 oz. of corn starch into

a small amount of it. Bring to boil the remaining milk and 1 lb. of sugar. Then add starch solution and remove from heat.

Now blend in a separate bowl: Eggs, 3¾ lb.; sugar, 1 lb.; salt, 8 oz.; vanilla, 8 oz.; mace, 4 oz.; and milk, 8 lb. Then introduce the cooked starch-milk-sugar blend and agitate vigorously.

Sprinkle the required amount of fresh coconut (about 1 lb. for this batch) into pastry-lined tins, put into oven, add custard filling with dipper, and bake at 425 deg. F. to golden brown.

Formula for Preparing Berger, Frank Buns

Question — Can you furnish me with a formula and directions for making hamburger and frankfurter rolls by the straight dough method?

Answer—Cream in a vertical-type beater-mixer: Sugar, 7 lb.; shortening, 5¼ lb.; salt, 14 oz.; and non-fat milk solids, 1¾ lb.

Add to above 23 lb. 3 oz. of water, and then 45½ lb. of flour (bread type). Dissolve 2 lb. 10 oz. of yeast in 7 lb. of water. Mix all ingredients to a medium, soft dough. Now let the dough rise to a full head, then punch and make up. Bake at 400 deg. F.

On Ripening Tomatoes

Question—Is it possible and practical to ripen tomatoes artificially, as bananas are?

Answer—Green tomatoes can be ripened by holding them under proper storage conditions. However, use of ethylene for ripening atmosphere, as for bananas, is not customary for tomatoes.

Upon arrival of the tomatoes at storage point, first step is to separate them according to degree of ripeness. Boxes are then stacked in ripening rooms equipped with heaters, cooling coils, and thermostatic controls. As received, the tomatoes are likely to be at a temperature below 60 deg. F.; so that heat is turned on in the rooms.

Ripening generates heat, and as the temperature nears 70 deg. F., the heat will be automatically cut off and the cooling coils brought into play. Desirable range is 60-70 deg. F., as higher temperatures produce more of a yellow color.

Of assistance during ripening is high humidity. Humidifying atomizers are, therefore, used to increase the moisture content of the air.

As far as practicality is concerned, this depends to some extent upon in-

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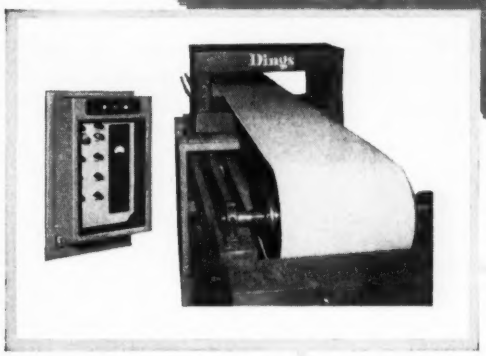

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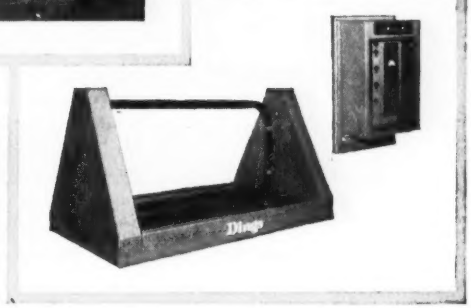

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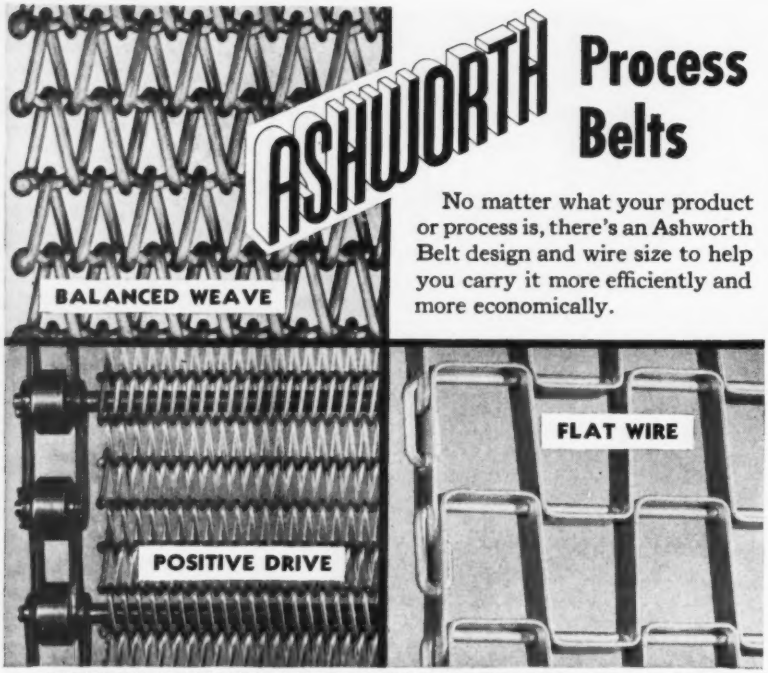

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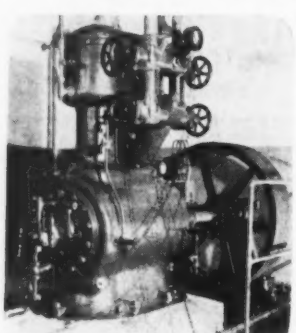

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The Sodus (Michigan) Fruit Exchange installed three large Frick compressors in 1948—has since added another big booster and 9 by 9 machine for the freezer storage illustrated. Installation by Hayes Brothers, Inc., Frick Distributors at Indianapolis and South Bend.

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tended use for ripened tomatoes. This is because the results are not equal to field ripening—the appearance may be blotchy, and some of the tomatoes may be soft.

Re Cream-Style Horseradish

Question—Due to the current scarcity of horseradish, we've considered switching from ground to cream-style product. Would you suggest a formula?

Answer—Here are directions for making a cream-style horseradish. Ingredients, of course, can be varied to suit your requirements.

Run washed, peeled, trimmed horseradish through a grinder. Boil 9 lb. of ground root for about 10 min. in 1 gal of 40 gr. distilled white vinegar. Then drain, filter, and save the vinegar.

Now to making the cream portion of the product. Into a bowl mixer add the filtered vinegar and 51 oz. of milk. Dissolve 3 oz. of salt and beat in 6 oz. of ground mustard. While mixing, add 35¼ oz. of egg yolks, and slowly run in 5 lb. of corn or cottonseed oil. Finally mix in the ground horseradish, and bottle.

Q.—How can I make up a cure for sausage meat? Say in 50-gal. batches?

A.—Into enough water to make up 50 gal. dissolve: Dextrose, 100 lb.; sodium nitrate, 34 lb., 6 oz.; and sodium nitrite, 3 lb., 2 oz. To each 100 lb. of meat, add 1 qt. of this curing solution.

Peanut Brittle Formula

Question—We are putting up specialty foods for the elite trade in gift packages. But one item we'd like to add is a 1 lb. package of peanut brittle. Would you give me a formula for this candy?

Answer—Bring to a boil in a steam-jacketed kettle: Corn syrup, 24 lb.; sugar, 36 lb.; brown sugar or molasses, 2 lb.; and water, 9 lb. Continue boiling batch for about a minute or so and then add 32 lb. of raw Spanish peanuts. Then continue cooking until temperature of the batch reaches 290 deg. F.

Turn off the heat, add 4 oz. of salt, sift 6 oz. of bicarbonate of soda into batch, mixing rapidly. Pour batch onto cooling slab, spreading as thin as possible. When partly cooled, turn batch upside down and again spread as thin as possible. Cut candy while still warm and then package when cooled.

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READER SERVICE

HERE'S WHAT'S IN THIS ISSUE

Use this index to find description of equipment, supplies and services of interest to you in this issue of FOOD ENGINEERING.

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ELEMENTS OF FOOD ENGINEERING, VOL 3. *By Milton E. Parker. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22. 1954. 233 pages. 9¼ × 6¼ in., cloth. Price:* $6.75

The third in a series covering the production, preparation, processing, handling, and distribution of food, this work continues the discussion of raw material conversion begun in Volume II.

Dehydration, drying, and evaporating are among the aspects covered, with treatment of the final product comprising the final section in the series. This section deals with coating and decorating, packaging materials, and packaging methods.

Illustrated with photographs, diagrams and tables, the book is subject indexed.

Machines to Fit the Man

HUMAN ENGINEERING GUIDE FOR EQUIPMENT DESIGNERS. *By Wesley E. Woodson. Published by University of California Press, Berkeley 4, Calif. 1954. 268 pages. 10¼ × 8 in., paper. Price:* $3.50

► For maximum efficiency, frequently used machine controls should be placed somewhere between elbow and shoulder height of the worker, with locations forward and slightly below shoulder height for "blind" reaching.

► Maximum forces can best be applied to levers gripped at shoulder level for standing operators, and at elbow level for the seated operator.

► When possible, control movements and locations should be parallel to the axis of the display motion they affect.

These are some of the facts covered in the section "Location of Controls." Companion sections include information on vision, design of equipment and workspace, audition, and body measurement.

Directed at aiding the engineer to fully utilize plant personnel through gearing of the machines to the man, rather than the man to the machine, the book is profusely illustrated with diagrams and charts.

The correct height for a work table, the effects of glare, the correct angle of stairways, and soundproofing, are only a few of the problems treated. The effective solution to them can be obtained only through full consideration of human characteristics—the average height, sensitivity of the eye, length of leg, and auditory thresholds. This work is of value to any plant man interested in maximizing the efficiency of his personnel.

Included are a bibliography and subject index.

Chemist in Business

CHEMICAL BUSINESS HANDBOOK. *Edited by John H. Perry. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 36. 1954. 1347 pages. 7¾ × 10 in., cloth. Price:* $17.00

Designed as a reference book for those in the chemical industry, this book offers a wealth of information on operations, methods, and fundamentals. Divided into twenty sections, it covers all phases of business operation from advertising to research. Each section is written by a specialist in the field and covers such topics as patents and patent law, purchasing, production, industrial toxicology, and cost accounting.

Of great practical value to the man in the chemical industry, the book contains a wealth of charts and graphs on all phases of industry.

Corporation Monograph

CORPORATE STRUCTURE OF THE CORPORATION. *Published by American Institute of Management, Inc., 125 E. 38th St., New York 16. 1954. 109 pages. 9 × 11¼ in., cloth. Price:* $12.00

Why were your plants first put where they are? Do these reasons still hold true? To what extent does the company operate on product-division lines? Do the board and committees meet regularly or irregularly?

These and 24 other questions are designed to demonstrate to the self-analyzing management whether any structural weaknesses exist. Each question is followed by a thorough discussion of the possible answers. The questions and answers are contained in chapters on meaning of corporate structure, authority and responsibility, non-management factors, committees, organization and operation, and communications.

The work is the second in a ten volume series directed at management evaluation and comparison.

Nomograph Collection

PLANT ENGINEER'S EASY PROBLEM SOLVER. *By Louis J. Murphy. Published by Conover-Mast Publications, Inc., 205 E. 42nd St., New York. 1954. 355 pages. 6¼ × 9¼ in., cloth. Price:* $6.00

The value of charts and nomographs as problem solvers cannot be argued. In time saved and errors prevented, they add much to the efficiency of the plant engineer. This book offers a collection of charts that allow the engineer to leap from raw data to an accurate solution.

No space is devoted to the theory of nomographs and intersection charts, the accent being on practical illustration.

An example of the value and wide range of the nomographs may be seen in that covering steam heating of water for processing. This is an angle that will interest food processors particularly, as will complete sections on refrigeration, pipe and piping, pumps, and industrial waste treatment.

Replacing Equipment

TESTED APPROACHES TO CAPITAL EQUIPMENT REPLACEMENT. *(Special Report #1) Published by American Management Assn., 330 W. 42nd St., New York 36. 1954. 94 pages. 6 × 9 in., paper. Price:* $3.25. *($2.25 to AMA members)*

The ever-present problem of replacing capital equipment has long been

SPECIAL DAIRY SECTION IN OCTOBER

Containing about 30 pages, a special insert in the next issue of FOOD ENGINEERING will carry ten articles on trends and developments in the dairy products field. Although originating in one branch of the food industry, this information will be of value to readers in the other branches. For the subjects discussed are basic to the industry as a whole.

Here are some of them: Changes and Challenges, Automatic Process Control, Better Personnel Relations, Improved Waste Disposal, Plant and Product Sanitation, Quality Control, and Moisture Removal.

In addition, there will be another dozen articles in the October FE from other branches of the industry.

It will be a big issue, with helpful information for all—The Editors

a pressing one for management. Technological progress calls continuously for the purchase of new machines to replace obsolete one.

The question of when to make the change, and whether the change is absolutely necessary is discussed in this book by companies that have devoted considerable time to its study.

The report has been adapted from material presented at a 1954 AMA special conference.

Ups Worker Productivity

—*Continued from page 66*

This method, called progressive packing, requires two or more workers to completely fill a tray and is more effective. It is possible now for a crew of six packers to fill about 3,600 consumer packages an hour compared with 2,000 packages per hour for individual filling of an entire tray.

These tomato trays, received flat from Standard Folding Trays Corp., Brooklyn, N. Y., are inserted into Standard's tray-erecting machines, which ejects them assembled at rates up to 100 per minute. Trays are automatically fed onto the tray-filling belt and pass side by side under the tray-fillers' hands.

This mechanical tray set-up and systematic feed requires an average of 0.028 man-hour of direct labor to set up 100 trays. The tray filling operator nearest each of the two tray-erecting machines supplies the machines with the flats, in addition to filling trays with tomatoes.

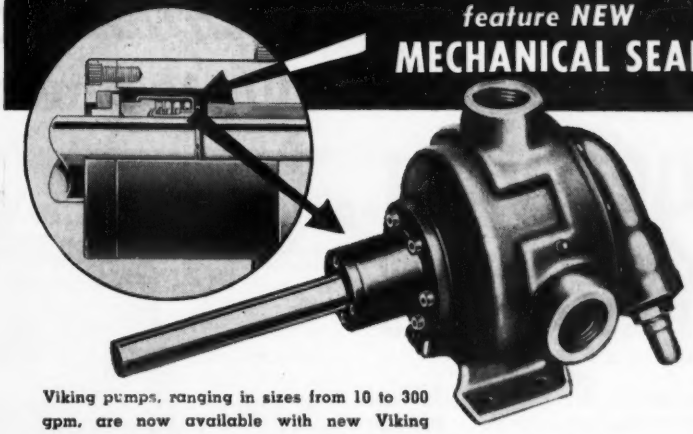
After the trays are filled, they continue along each of the conveyor belts and are automatically fed into the two Model FA Package Machinery Co. units which overwrap full trays at speeds up to 100 per min., with an average operating speed of 75 per minute. The cellophane film is supplied in rolls by E. I. Du Pont de Nemours & Co., Wilmington, Del., and Sylvania Division, American Viscose Corp., Philadelphia.

The trays emerge from each overwrapping machine onto a runout table where operators place them ten each into fiberboard master shipping containers. From here the containers are hand-trucked to an elevator, a short distance away, that leads to the ground floor.

Mechanization in fresh produce packaging plants has helped to lift that entire industry to a prominent and growing place in the produce business. Only by planned engineering of machinery to fit the plant layout will labor costs be reduced.

End (Resume reading on page 67)

135 VIKING PUMP MODELS
feature NEW
MECHANICAL SEAL



Viking pumps, ranging in sizes from 10 to 300 gpm, are now available with new Viking leak-proof mechanical seals. These same pumps are also equipped with bearings requiring no outside lubrication whatsoever.

Both features are available on regular line of pumps, all-weather single and twin units and Underwriter's approved models. See what these latest lines of Viking pumps can do for your pumping problems. Ask for bulletin SP-336E today.

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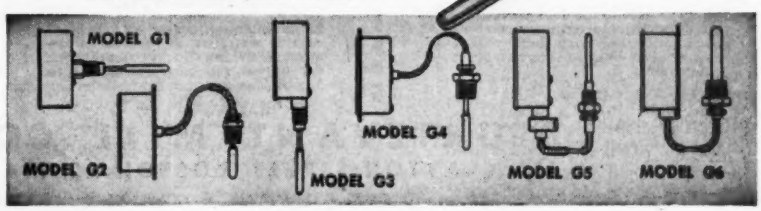

For more information, use coupon on page 227.

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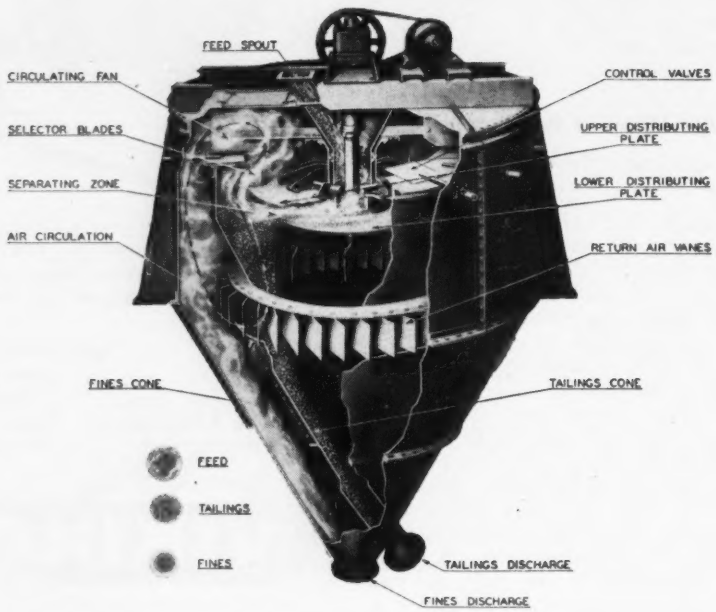
The Sturtevant Air Separator is one investment that pays off daily profits by increasing production and reducing costs. Its extremely efficient operation assures finer separation of fine material from coarse material with the result that uniform quality of product is always obtained.

They'll not only increase your output by as much as 300%, but provide 10 to 50% savings in power costs, too. They are available in sizes 3 to 16 feet in diameter with capacities from ¼ to 50 tons per hour with a fine-product range of 40 to 325 mesh or finer. Bulletin 087 gives the entire story. Write for your copy.



Other Sturtevant Equipment for Increasing Production and Cutting Costs

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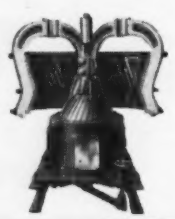
A fluid jet grinding machine, the Sturtevant Micronizer speeds reduction of materials to low micron sizes. These jet mills are especially applicable in fields where a particle size in microns is desired.

Sturtevant Micronizer grinding machines are available in many sizes and capacities.



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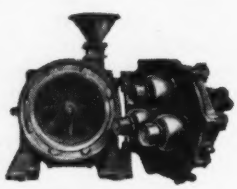
for intermediate and fine reduction (1" to ¼"). Open door accessibility. Soft or moderately hard materials. Efficient granulators. Excellent preliminary Crushers preceding Pulverizers.



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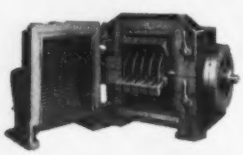
for medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operate in closed circuit with Screen or Air Separator. Open door accessibility. Many sizes. No scrapers, plows, pushers, or shields.



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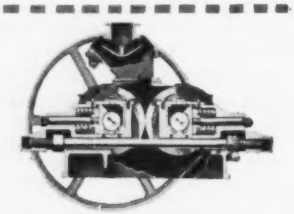

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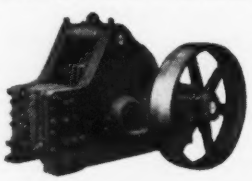

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KEEPING UP WITH THE FIELD

Technical News • Washington Highlights • Economic Trends • Labor Developments

Rays Up Spud Life

Sprouting of potatoes may be curbed and storage life thus prolonged by treatment of the spuds with gamma rays from cobalt-60.

So reports Brookhaven National Laboratory, Upton, L. I., N. Y.

Taste is not harmed, and meanwhile softening of the potatoes is retarded, say the biologists, who stress that the tubers are not made radioactive by the rays.

Keeping Bread Fresh

Staling of bread can be retarded longer, say researchers at the American Institute of Baking, by assuring high crumb moisture at the time of wrapping and also a higher gluten content. Recommended is a loaf moisture as near to the legal limit of 38% as is practical.

Sensory tests show that a decrease of 2% in crumb moisture accelerates staling by one day. And high gluten (17.2% flour protein) improves keeping quality between the third and sixth day of storage. During the first three days, however, staling is at the same rate, regardless of gluten content.

New Sediment Tester

Two members of the Kansas State College faculty have been awarded a patent for a 2-stage sour-cream sediment tester that is applicable to many other food products.

Unit comprises two filters. The first is fairly coarse for removal of larger particles, such as curds and slime, while the second removes smaller particles.

New tester is claimed to be both quicker and more effective than ordinary sediment testers.

Larrick Heads FDA

New Commissioner of Food and Drugs is George P. Larrick, formerly Deputy Commissioner and a career employee of FDA since 1923.

He succeeds Charles W. Crawford who, now 66, has resigned after serving public and industry for 37 years.

Mr. Crawford is cited for his work in drafting food and drug regulations and standards. He was principal representative for FDA with members of Congress and advisors who drafted the present FD&C Act of 1938.

Meat Packers' Cooling-Unit Problems Weighed by Refrigerating Engineers

Equipment used in meat-packing refrigeration came in for major attention at the recent Seattle meeting of the American Society of Refrigerating Engineers.

Coolers were dealt with first, consensus being that unit coolers, in batteries on the floor as space allows, are to be favored in construction of a new plant, while overhead coils with fans are most feasible in conversions.

Fans were called "most critical from the maintenance standpoint." A number of packers are ordering stainless steel fans which, although more expensive, are less subject to breakdowns. In contrast, some engineers favored the economics of using fan sections that have been hot-dip galvanized. Granting the expense of replacement, they said such a fan could last 10-15 years with proper maintenance, except in carcass room.

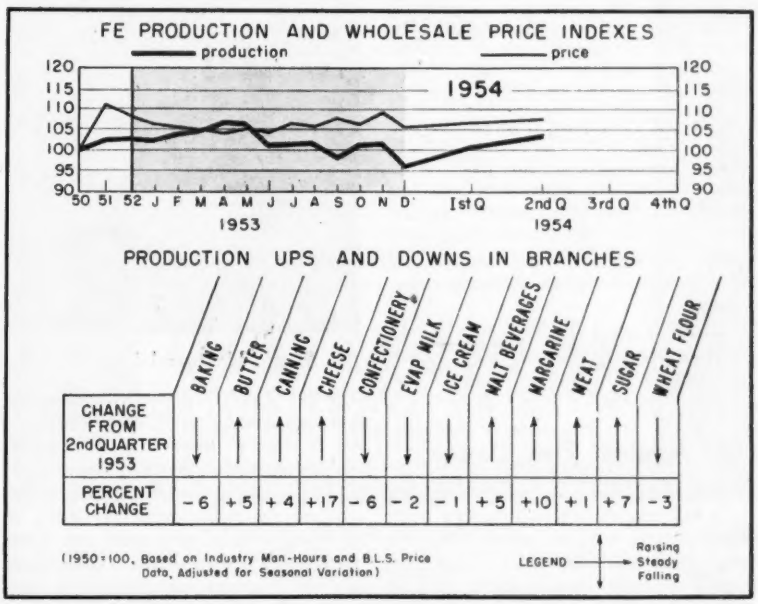
However, other engineers questioned hot-dip galvanizing relative to proper balancing of the fan. Here, bonding of plastic film to metal might prove the answer, provided the problem of erosion can be solved.

Compressors. As for single-acting vertical compressors versus high-speed multi-cylinder compressors, the engineers agreed that the former would give adequate service where space is available. But overhaul was termed more difficult for this unit. The trend was seen in the direction of the high-speed type.

Control of humidity in the "hot cooler" also was discussed. One packer reported that, after his air circulation was kept at a high rate for 10-12 hr., he then cut the air speed in half, since air movement is the greatest single factor in the removal of moisture.

Maintenance of brine at a strength sufficient to avoid the absorption of moisture was recommended. Brine of proper strength mantains a temperature of 34 deg. without forming ice on the coils.

A Canadian packer of carrots and nuts reported that he was able to lower humidity in his holding room by cold-water defrosting. As the fin coils were defrosted, they drew moisture out of the room, he reported.



PRODUCTION CLIMBED steadily in the food manufacturing industry during the first half of this year. The price trend also was up, but less sharply.

Three Colors Going Off Approved List

Now being readied by the Food and Drug Administration is an order to remove three coal tar colors from the list of dyes approved for food use.

The order comes as a result of FDA's tests on the dyes, conducted during the past few years, and it follows a hearing on the matter last January (FE Feb., p. 201).

Details of this specific case, however, have not caused industry men their real worry. Instead, they are apprehensive that this action will lead to a long-range public relations problem for food industry and for FDA itself.

FDA has been making animal feeding tests on the whole series of approved colors, and it now has initiated further checks on certain of the colors. Some agency officials feel that it will probably not start any further decertifications until these tests are complete, which won't be before 1957. While FDA officials will only say that they are studying "subtle reactions" in these new tests, observers feel that these may include investigation of possible carcinogenic properties.

A recent *New York Times* report quoted doctors at the 6th International Cancer Congress in Brazil as saying that FDA was approving human-food use of dyes known to cause cancer in animals. But agency officials say they know of no such studies, and that if such evidence were turned up, they would take immediate action. Said one division head: "There is no tolerance for a carcinogen."

Among the materials additionally tested by FDA are the so-called "Big Four" in FD&C colors—Reds 2 and 4 and Yellows 5 and 6. These dyes account for two-thirds of the volume of certified coal tar colors.

The dyes about to be decertificated are Orange 1 and 2 and Red 32. Primary grounds for this action were gastric disturbances in laboratory animals when the dyes were fed to them at levels 10 to 200 times those normally used in foods.

Because evidence concerned only such food use, there has been quite a battle over whether to continue to allow use of these colors in drugs and cosmetics.

FDA has three categories for coal tar colors: For colors usable in foods, drugs, and cosmetics; for drugs and cosmetics; and for external-use drugs and cosmetics. It's probable that the three colors will end up on the external D&C list. But whether this will be done by "down-certifying" the colors, or by decertifying and then holding hearings to recertify, depends on legal interpretations.

Industry lawyers have been taking the position that down-certifying is permissible under the law. Since this is the first decertification case, they are anxious that no precedent be set which would allow FDA to decertify a color for all three uses on the grounds that it is harmful for one use. Possible later recertification, they feel, would not change the legal precedent of complete decertification.

To Make Orange Powder In New Florida Facility

Production of orange powder similar to that made by The Vacu-Dry Co., Oakland, Calif. (FE Mar. '53, p. 59) will get under way in the near future at a facility now under construction for Orange Crystals, Inc., at Plant City, Fla.

Here, a Chain-Belt vacuum dehydrator, with a capacity of several hundred pounds of crystal per hour—the juice from about 15,000 oranges—is to be used. In this unit, concentrated juice—40-45% solids—will be picked up from a feed pan by a roller applicator and applied in a thin layer to a drying belt.

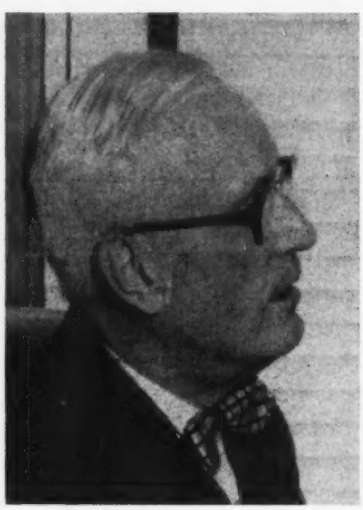
Belt carries juice around a heating drum, where drying takes place, then around a chilling drum that cools the powder to room temperature. At this point a doctor blade peels dried juice from belt and it drops into a screw conveyor that moves it from dehydrator.

Plant is near J. William Horsey Corp.'s concentrating plant, which presumably will supply material for drying operation.

Act Against Fish Plague

The "red tide" marine plague that kills millions of fish in Florida's west-coast waters will be under extensive study this year from a new vessel recently commissioned by the U. S. Fish & Wildlife Service.

Ship is fitted with instruments to measure water temperatures and obtain samples of water for tracing microorganisms. It will be used to make routine surveys to locate concentrations of microorganisms, and to experiment with chemical controls.



His Work Honored by QM

The QM Corps' Certificate of Achievement has been awarded to R. C. Pollock, retiring director of research of the National Live Stock & Meat Board, Chicago.

Mr. Pollock is cited for his outstanding wartime cooperation with the Army in providing soldiers with more and better fresh and processed meats. Further noted are his numerous contributions to more efficient handling of meat, from procurement to serving.

12-Man Team Going on Diet Of Ray-Sterilized Foods

Human consumption of irradiation-sterilized foods specifically will be studied in tests at Fitzsimons Army Hospital nutrition laboratory, Denver.

Twelve conscientious objectors to war, volunteering through Selective Service, are going on a regular irradiated-food diet to be continued for many months. They will be under constant observation by doctors and nutrition experts.

Food to be eaten will be subjected to ionized radiation from cobalt at the Idaho Falls laboratory of the Atomic Energy Commission.

Lt. Col. T. E. Huber, of the Army surgeon general staff, said that if irradiation preservation of food is proved effective "it may change our concepts of modern food sterilization."

The commander of the nutrition laboratory, Lt. Col. Robert Ryer, said the Department of Defense has been experimenting for some time with the possibilities of radiation preservation and that treated foods fed to rats, since March, have had no ill effects.

Treated meat products first will be served to the men. Irradiation of vegetables and liquids awaits development of safe handling methods. The exposed foods will be packed with dry ice in sealed containers and flown to Denver. They will be consumed within two to three days after being irradiated.

Ryer said radiation "alters to a slight

extent" the taste, smell, and appearance of foods. Over-radiation will ruin foods, but its effect on digestive systems is not known, he said.

Irradiation studies on foods also are underway at MIT, Michigan and Columbia Universities, Brookhaven National Laboratory, the Hormel Institute, and American Meat Institute (also see "Grappling With the Problems of Gold Sterilization," feature article on p. 70).

Food Supply Up

Major food supplies for the civilian market will be somewhat larger during the late summer and fall than a year ago, notes USDA.

Significant in the more abundant supply, states the Department's publication, *The National Food Situation*, are the increases over latter '53 in pork, veal, lard, turkey, eggs, processed fruits, fresh vegetables, and rice. Most of these rises stem from greater output.

Only major items which will be down this fall are lamb and mutton.

Hors d'Oeuvres

▶ Discovered recently in a New England cellar, a 50-year-old can of Van Camp's Extra tomatoes was said to be still fine in flavor, color, and odor. When they put "Extra" on that label, they weren't kidding.

▶ Kissproof garlic sauce we have now—from Brooklyn's Derry Products Co. With this, the lady can reach a man's heart through his stomach and then seal the deal with pleasure.

▶ Gerber's slogan is "Babies are our business—our only business." Seems the company has a better arrangement than parents.

▶ University of Maryland has developed a chicken with flight feathers missing from its wings. Saves work in poultry dressing plants. But they shouldn't crow over progress until they have eliminated the wings.

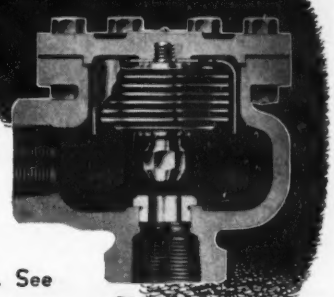
▶ All kinds of cute conveniences are being installed in new submarines, including a juke box. But the kitchen crew still has to peel potatoes by hand. Hasn't the Navy ever heard of food engineering?

▶ A $4 million cold storage warehouse is being built in a cave west of Kansas City. We knew that, sooner or later, they would have to bury that surplus butter.

▶ A new fly killer recommended for farmers is a mixture of sugar and malathion, Diazinon, or Bayer L 13/59 sifted on the barn floor from a pint jar with holes punched in the top. In lab tests, an insecticide concentrate of 0.1% killed 99% of the flies in 16 hours. Question: Does the sugar draw a new batch of flies?

NICHOLSON TRAPS

for every plant application



Send for Nicholson catalog 953. This 32-page standard reference on advance-type trapping of steam, air and other mediums contains: installation diagrams, charts for determining trap sizes, and advice on specific problems. See why leading plants are increasingly standardizing on Nicholson traps for increased production and minimum maintenance: thermostatic (illustrated) and metal expansion for pressures to 250 lbs.; weight and piston-operated, to 1500 lbs.

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Why not check your operations? The installation of a Cyclone Belt may increase production, speed up operations, reduce your costs. One of our experienced engineers will be glad to consult with you. Write to Dept. H-94 for your free copy of Catalog #5. There is no obligation.

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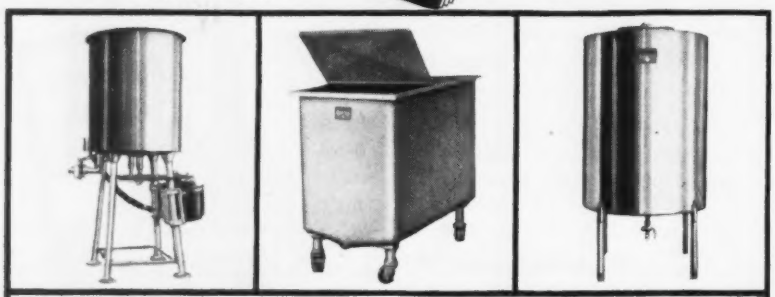

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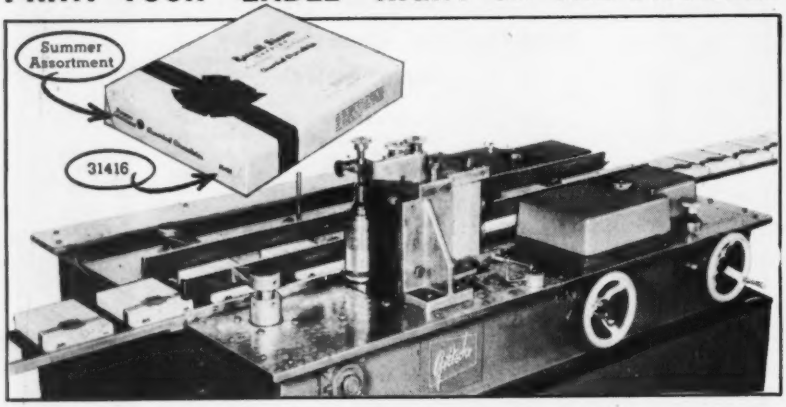

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THE RED FEATHER

October is United Community Campaigns of America month.

"The Community Chest is one of the safeguards against too much government control of our personal lives. It provides a means for taking care of ourselves and our neighbors instead of looking to government to do the job."—United States Senator Margaret Chase Smith.

Food companies need good community relations. And one step in building them is to contribute to the Community Chest. Another is for an executive to participate in the fund raising campaign.—The Editors

Top Program of Seminars Slated for Package Forum

A broad program, highlighted by three days of special seminars, is announced for the coming 16th Annual Packaging Institute Forum, seen drawing a record registration at the Hotel Roosevelt, New York City, Oct. 25-27.

The opening address will delve into Packaging and Its Relation to Color Television, and there will be a color demonstration. The preliminary program then lists these afternoon sessions pertinent to the food field: Packaging Materials, Packaging Education, and Adhesion.

Second-day topics: Know Your Printing Processes for Packaging, Package Forming From Thermoplastic Sheeting, Production Meeting, and Shipping Containers.

Last day: Statistical Methods and Quality Control, Flexographic Printing Problems, Fundamental Properties Affecting Printing, and the Food Packaging Seminar.

Bakery-Dairy Cooperation

Closer coordination between the baking and dairy fields was recently mapped at a Chicago meeting of the special Baker-Dairy Committee, formed of members of the American Bakers Assn. and the American Dry Milk Institute.

Representatives of the ABA, ADMI, American Institute of Baking, and Bakers of America Program were instructed to arrange the necessary program for promoting the nutritional aspects. It was noted that bread is the greatest single user of non-fat milk solids.

Co-leaders of the Baker-Dairy Committee are AIB Chairman L. E. Caster, of Keig-Stevens Co., Rockford, Ill., and B. F. Beach, Michigan Producers Dairy Co., Adrian, Mich.

"We particularly warrant toughness and durability of this carton. Our test sample was left along in a room with five small boys for an hour—and it was still intact when we took it out!"

Briefly . . .

● Personnel Planning Council of American Management Assn. has J. Howell Turner, director of employee relations, California & Hawaii Sugar Refining Corp., as a new member. Council chairman is Samuel L. H. Burk, director of personnel administration, General Foods Corp.

● COCOA BEAN imports fell to less than 2,000,000 bags in the first half of '54. Fully 25% under a year ago, the drop further accents current pressure on the hard-put chocolate candy bar.

● SANITATION in food plants will get top attention in a new course offered by the evening college of Drexel Institute of Technology, Philadelphia. Identification with food industry is required for enrollment. Classes start Sept. 20.

● POULTRY canned or employed in canning ran to the largest volume on record in June, our latest month report by USDA.

● FREE ENTERPRISE award — the "Business Oscar"—has gone to Robert S. Graves, president of Louis L. Libby Food Products, Inc., Long Island City, N. Y., processor of precooked frozen foods. Mr. Graves was cited for his broad activities. He is also president of Madison Frozen Food Locker Co., Shen Valley Meat Packing Assn., and Blue Ridge Fruit Growers Assn., and also serves as a director of Rockingham Poultry Co., all in Virginia. Donor of award is Free Enterprise Awards Assn.

● NUTRITION honors have been tendered by the Poultry & Egg National Board to Adm. Richard E. Byrd and Paul Dean Arnold, both of Arnold Bakers, Inc., Port Chester, N. Y. Scrolls presented cite the Admiral's discoveries leading to the making of frozen baked bread, and Mr. Arnold's pioneering efforts in promoting use of eggs in breadstuffs.

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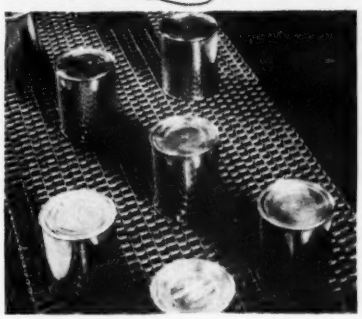
. . . FOR FOODS IN PROCESS!



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UNITED NORIT SALES CORPORATION LTD., Amsterdam, Holland

Fish Sticks Rocket

Production of fish sticks jumped to 9,000,000 lb. in the first quarter of '54, exceeding by 1,500,000 lb. the whole output of '53.

And estimates have it that a whopping volume of 40,000,000 lb. will be chalked up for the year.

Whereas only 13 firms reported making the popular breaded food item last year, this group now is merely the nucleus of a big and growing field of stick processors.

Mellorine Output Doubled

Production of vegetable fat frozen desserts (mellorine) amounted to 22,494,000 gal. in 1953 as compared with 10,870,000 gal. in 1952.

However, figures for 1953 were compiled from nine states, whereas those for 1952 were for four. Not included were outputs in Alabama and Arkansas, where authority to manufacture mellorine or mellorine-type products was not granted until late in the season.

Texas, leading producing state, showed an increase of 71%, and Illinois, second in production, gained 116%.

Soft Drink Technologists Tackle Process Studies

Plans have now taken shape to assign twelve pertinent projects to working committees of the Society of Soft Drink Technologists.

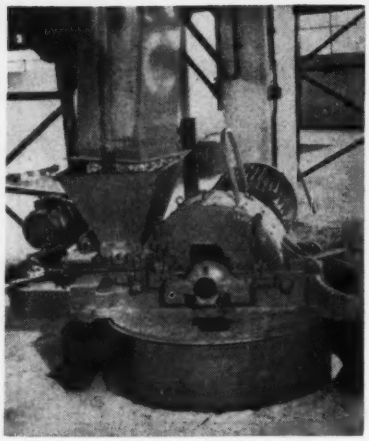
Projects to be studied are: Production line efficiency; glass containers; metal containers; sanitary problems and methods: codification of State and Federal regulations; water treating methods; bottle washing; compounds and problems; quality control methods of analysis; carbonation; plant design; handling beverages after production, and flavors and colors.

Pannill Martin, Cloverdale Spring Co., Baltimore, chairman of the membership committee, advised that the Society now has 102 members.

"A" Cottage Cheese Only

All cottage cheese sold in Spokane, Wash., now must be made of grade A milk.

Main object of this new local ordinance is elimination of the surplus of grade A milk, which has been augmented by importation of cheese made from grade C.



'54 Way of Making Tortilla Flour

Here's closeup shot in processing of a newly developed tortilla-flour mix (FE Apr. p. 205). Steeped, limed kernels pour into hopper feeding one of battery of Micro-Pulverizer wet-grinding units (Pulverizing Machinery Co., Summit, N. J.) at Mexican plant of Maiz Industrialazado, S. A. Finished mix, dehydrated in specially designed dryer, has notable shelf-life of 6 months. Brand-named "Masa Harina" (Spanish for "flour dough"), new product is in radical contrast to traditional native flour, yet reportedly has won wide acceptance south of the border. It was developed by Armour Research Foundation of IIT, Chicago, in cooperation with Mexican scientists. Since it also simplifies preparation of tamales, corn chips, enchiladas, tostadas, and the like, popularity with Americans is seen. Hence, Quaker Oats Co. has acquired license from the Bank of Mexico and now is manufacturing and distributing the mix in the U. S.

Grain Man in H-E-W

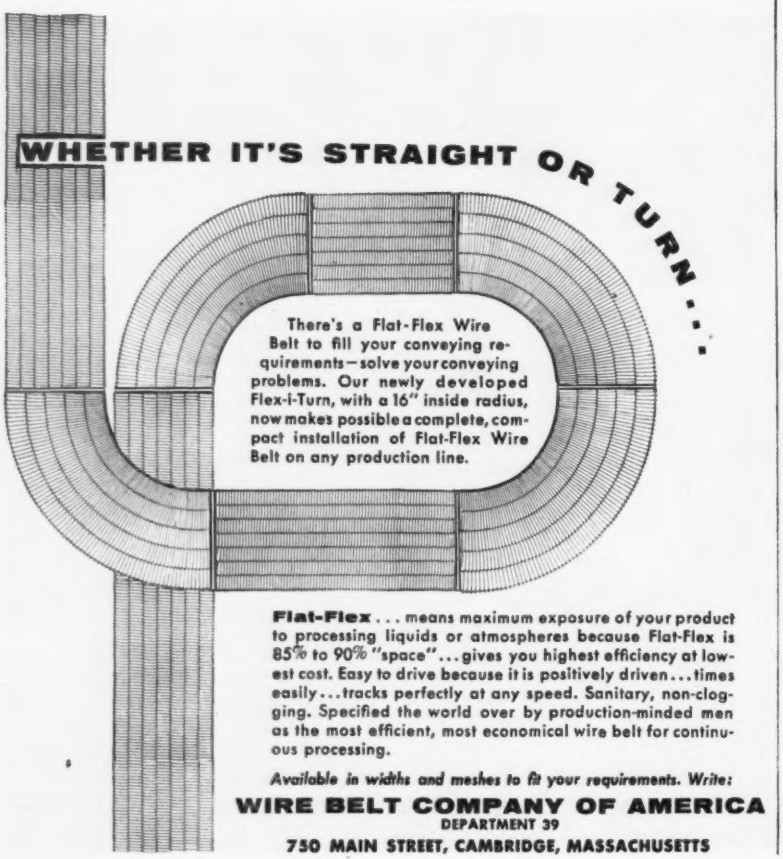
Bradshaw Mintener, Pillsbury Mills' general counsel, takes over this month as Assistant Secretary of Health-Education-Welfare. He'll be the industry man handling FDA affairs for H-E-W Secretary Oveta Hobby. Confirmed unanimously by the Senate, he replaces Russell Larmon.

And now expected is a decision on whether FDA resumes its grain sanitation inspections. These check-ups were curtailed last year to allow a committee to study enforcement levels. Its report to the Secretaries of Agriculture and H-E-W now is awaiting action.

Improved Culture Medium

More facile growth and isolation of canned-food spoilage organisms for study cultures is reported with use of PE-2, a new bacteriological medium.

Developed by Dr. C. Schmidt and Continental Can Co., the product is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Office-Style Coffee Bar

Designed for offices and industrial plants, this coin operated coffee vendor is seen reducing the time factor in coffee breaks, model shown is 200-cupper. Introduced by Bert Mills Corp., St. Charles, Ill., new unit features a selector dial to serve beverage to user's taste. For quick maintenance, a roll-out mechanism is incorporated to bring equipment out of its cabinet.

stated to be superior to conventional media for preparation of spore suspensions of putrefactive, thermophilica, and butyric anaerobes.

Preparation is simple: Add 12 dried, small Alaska seed peas to 20 ml. 2% peptone solution in 20x150 mm. screw cap tubes. Autoclave 15 min. at 15 lb. pressure (250 deg. F.). The pH is about 6.5, and needs no adjustment.

USDA & FDA Standards

Recent actions by USDA's Agricultural Marketing Service on food standards and by FDA on standards hearings, along with *Federal Register* citations, include the following:

Grapefruit grown in states other than Florida, California, and Arizona, revision, July 20 *F.R.*, p. 4435.

Turnips, new consumer standards, July 20 *F.R.*, p. 4440.

Oranges grown in states other than Florida, California, and Arizona, revision July 23 *F.R.*, p. 4555.

Whole milk, dry, new standards, Aug. 5 *F.R.*, p. 4899.

Relative to food standards, FDA's statement of general policy in respect to administration of the Hale food standard amendment, which would eliminate need for public hearings on non-controversial standard changes, appears in the July 27 *F.R.*, p. 4612.

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Schedule of Events

September

16–17—American Butter Institute, annual meeting; Knickerbocker Hotel, Chicago.
17–19—National Poultry, Butter & Egg Assn.; Chicago.
19–22—National Frozen Food Locker Institute; Hotel Jefferson, St. Louis.
19–22—National Tea Assn.; Mt. Washington Hotel, Bretton Woods, N. H.
20–22—Mayonnaise, Salad Dressing Manufacturers Assn.; Hershey Hotel, Hershey, Pa.
23–26—Packaging Machinery Manufacturers Institute; Grove Park Inn, Asheville, N. C.
26–28—Southern Bakers Assn. Production Conference; Hotel Biltmore, Atlanta, Ga.
26–30—Master Brewers Assn. of America, annual convention; Waldorf-Astoria Hotel, New York City.
28–30—National Industrial Packaging & Materials Handling Exposition (Coliseum); and annual convention of Society of Industrial Packaging & Material Handling Engineers, Chicago.
30–O2—Southwestern Frozen Food Assn., New Orleans, La.

October

1—Cereal Institute, Chicago.
3– 5—Western Regional Frozen Food Conference, annual; San Francisco, Calif.
4– 7—Produce Prepackaging Assn., conference and exposition; Shoreham Hotel, Washington, D. C.
8–12—American Meat Institute, annual meeting; Palmer House, Chicago.
9–16—International Dairy Exposition; Union Stockyards, Chicago.
10–12—National Pretzel Bakers Institute; New York City.
11–13—American Oil Chemists' Society, annual fall meeting; Radisson Hotel, Minneapolis, Minn.
11–13—American Management Assn., manufacturing conference; Hotel Plaza, N. Y. C.
12—National Dairy Council, June Dairy Month Sponsor Comm.; La Salle Hotel, Chicago.
12–15—National Chemical Exposition; Coliseum, Chicago.
14–15—Baking Industry Sanitation Standards Committee; Sherman Hotel, Chicago.
16–20—American Bakers Assn., annual meeting, and Bakery Equipment Manufacturers Assn. (Oct. 17); Hotel Sherman, Chicago.
17–19—Brewers Assn. of America, convention and exhibit; Edgewater Beach Hotel, Chicago.
18–22—National Safety Congress & Exposition; Chicago.
20–23—National Assn. Retail Ice Cream Manufacturers, annual meeting; Traymore Hotel, Atlantic City, N. J.
21—Central States Frozen Foods Assn.; Hotel Sheraton, Chicago.
21–23—International Assn. of Milk & Food Sanitarians; Hotel Morton, Atlantic City, N. J.
23–26—Confectionery & Allied Products Exhibit; Hotel New Yorker, New York City.
24–30—Milk Industry Foundation, annual convention (to 27th); International Assn. of Ice Cream Manufacturers, annual convention (27-29); Dairy Industries Supply Assn., exposition (25-30, Convention Hall); Atlantic City, N. J.
25–27—Packaging Institute, annual forum; Hotel Roosevelt, N. Y. C.
26–29—American Dietetic Assn.; Benjamin Franklin Hotel, Philadelphia.
27—Evaporated Milk Assn.; Madison Hotel, Atlantic City, N. J.
27—National Pickle Packers Assn., annual meeting; Drake Hotel, Chicago.

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Recent Inventions

PRODUCTS

Meat Curing Preparation Including Sodium Chloride, Lactic Acid and Calcium Lactate—*R. H. Starr, Kansas City, Mo. No. 2,681,287. June 15, 1954.*

Synthetic Meat From Protein Filaments and Edible Cereal Binder—*R. A. Boyer, Cincinnati. No. 2,682,466. June 29, 1954.*

Food Product Comprising Animal Fatty Tissues Fermented With *Penicillium Roqueforti*—*C. Pavia, New Market, and A. J. Kramer, Arlington, Va. to Pavia Process, Inc., Washington, D. C. No. 2,682,470. June 29, 1954.*

Liquid Center Confection by Forming Frozen Pellet of Edible Substance, Surrounding With Warm Candy, Cooling, Coating—*J. G. Alther, Evanston, Ill. to P. M. Van Arsdell, Chicago. No. 2,682,471. June 29, 1954.*

Stable Boiled Icing Base Comprising Egg Albumen, Edible Water-Soluble Gum, Calcium Sulfate, Sodium Aluminum Sulfate, Powdered Sugar, Starch, Flavoring—*W. W. Wagner, New Orleans, La. No. 2,682,472. June 29, 1954.*

Stabilized Fats and Oils Containing 0.001—1.0% by Weight Propenyl Derivative of p-Hydroxyanisole—*A. Bell, M. B. Knowles, and C. E. Tholstrup, Kingsport, Tenn. to Eastman Kodak Co., Rochester, N. Y. No. 2,682,474. June 29, 1954.*

Rust Preventive Lubricant Containing Organic Substance and Minor Proportion of Ester of Alkyl Succinic Acid—*G. H. Von Fuchs, Niagara Falls, N. Y. No. 2,682,489. June 29, 1954.*

Bland Soy Bean Derivative That Forms Stable Foam in Aqueous Solution at Room Temperature—*P. A. Singer, and H. J. Deobald, Peoria, Ill., to Allied Mills, Inc., Ind. No. 2,683,091. July 6, 1954.*

Pasteurized Cream Whipped by Controlled Gas Injection Into Reciprocating Partially Filled Containers—*F. F. Suellentrop, to Lemay Machine Co., Lemay, Mo. No. 2,683,558. July 13, 1954.*

Grated High-Fat, Non-Caking Cheese by Mixing Comminuted, Dried Natural, and Finely Divided Process, High-Fat Cheeses; Tempering Under Controlled Temperature and Humidity—*E. Traisman, Des Plaines, and W. Kurtzhalts, Wheeling, Ill., to Kraft Foods Co., Chicago. No. 2,683,665. July 13, 1954.*

Alpha-Amylolytic Separated From Proteolytic Enzymes by Controlling pH, Temperature, Holding Time of Mixture—*B. S. Miller and J. A. Johnson, Manhattan, Kansas, to Research Corp., New York. No. 2,683,682. July 13, '54.*

Antioxidant Particles Comprising 50-90% Butylated Hydroxyanisole, 10-50% Propyl Gallate—*A. E. Hoffman, C. Hills, J. A. Chenicek, Bensenville, and H. E. Whitmore, Evanston, Ill., to Universal Oil Products Co., Chicago. No. 2,683,694. July 13, 1954.*

Monoclinic L Glutamic Acid Crystallized From Aqueous Solution at pH 2.5-4.0, by Seeding—*S. H. Weidman, Los Gatos, Calif., to International Minerals & Chemical Corp., New York. No. 2,683,739. July 13, 1954.*

PROCESSES

Stabilizing Fatty Material Against Oxidation by Incorporating Solution of Glycine and Phosphoric Acid in Hydroxy Polyalkylene Oxide Ether of Fat-Forming Fatty Acid—*N. H. Kuhrt to Eastman Kodak Co., Rochester, N. Y. No. 2,681,282. June 15, 1954.*

Preserving Potatoes by Cutting Into Pieces, Subjecting to Density Fractionation and Preservation Process—*C. E. Hendel, El Cerrito, Calif., and H. S. Olcott, Berkeley to Sec'y of Agriculture. No. 2,681,285. June 15, 1954.*

Improving Whipping Properties of Fermented, Dried Egg Whites by Adding Not Over 1% Acetyl-Methylcarbinol—*L. B. Jensen, Chicago and C. Hale, Glen Ellyn, Ill., to Swift & Co., Chicago. No. 2,681,286. June 15, 1954.*

Converting Milk Lactose to Glucose and Galactose by Concentrating Liquid to 20% Solids, Adding Lactose Enzyme to Hydrolyze Lactose to Lactase Hydrolytic Sugars—*E. G. Stimpson, Sayville, N. Y. to National Dairy Research Laboratories, Inc., Islip, N. Y. No. 2,681,858. June 22, 1954.*

Separation of Lysine From Lysine-Containing Protein Hydrolysates by Treating With Solution of Organic Acid in Lower Alkyl Ketone, Separating Lysine-Acid Compound, Recoving Lysine—*E. V. McCollum and A. A. Siegenthaler, Baltimore, to Research Corp., New York. No. 2,681,927. June 22, '54.*

High Casein Food Made by Coating Particles of Casein With Aqueous Solution of Lactalbumin and Lactic Acid, Comminuting, Spray Drying—*G. H. Stuart, New York, H. Howard, Hastings-on-Hudson, and J. T. Watson, North Tarrytown, N. Y., F. H. Clickner,*

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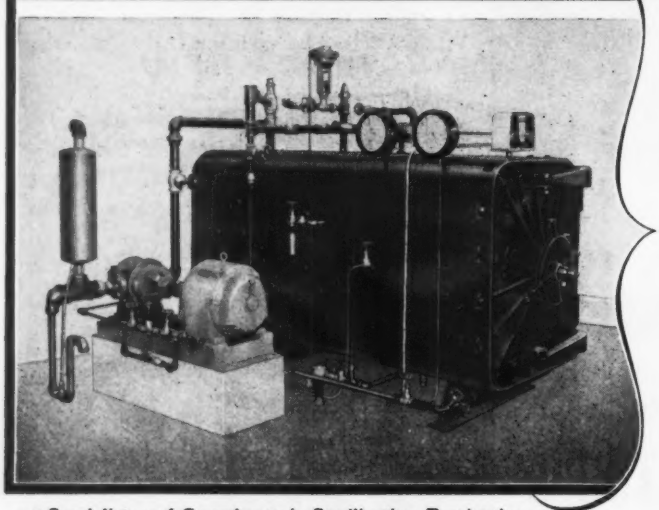

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AMERICAN STERILIZER COMPANY • *Erie, Pennsylvania*

Hollywood, Fla., and W. A. *Sommer, Elgin, Ill.* to Borden Co. No. 2,682,469. *June 29, 1954.*

Sugar Beets Extracted With Penicillin-Treated Water to Control Contamination—A. S. *DuBois, Floral Park, N. Y.*, and M. M. *Reynolds, Old Greenwich, Conn.* to West Disinfecting Co., Long Island City, N. Y. No. 2,682,487. *June 29, 1954.*

Improved Sugar Purification by 2-Step Wash Starting at Top of Centrifuge Bowl—E. G. *Kochli, Scarsdale, N. Y.*, and C. A. *Olcott, West Milford, N. J.* No. 2,682,488. *June 29, 1954.*

Glucuronic Acid-Glucuronolactone Mixture Recovered From Hydrolyzate of Purified Ester of Water-Soluble Glucose Derivative —A. L. Wilson, *Palos Park*, and A. M. *Mark, Chicago* to Corn Products Refining Co., New York. No. 2,683,150. *July 6, 1954.*

Air Deodorized, Sterilized by Contacting Buffered 0.013% Aqueous Potassium Permanganate Solution —R. L. *Kuehner*, to York Corp., York, Pa. No. 2,683,074. *July 6, 1954.*

Phosphatides Removed From Edible Oils by Partially Neutralizing With Caustic Refining Agent, Centrifuging, Completely Neutralizing, Recentrifuging—D. W. *Dron, Poughkeepsie*, to De Laval Separator Co., New York. No. 2,683,155. *July 6, 1954.*

Drying Wet Containers by Compressed Air, Brushing to Remove Excess Fluid—C. L. Bowman, and D. K. *Kingsford*, to Gerber Products Co., *Fremont, Mich.* No. 2,683,315. *July 13, 1954.*

EQUIPMENT

Continuous Frying Apparatus Comprising Fat-Containing Kettle With Rotating Perforate Cylinder Having Helix to Move Products Slowly Forward Through Fat—H. R. *Maddocks* to Maddocks Potato Products Inc., *Boothbay Harbor, Me.* No. 2,678,599. *May 18, 1954.*

Roll Creasing Apparatus Consisting of Pan Guide and Positioning Frame, Vertically Movable Plate Having Plurality of Wedge-Shaped Crimping Elements—W. H. *Jennings, Charlotte, N. C.* No. 2,678,613. *May 18, 1954.*

Sheet Dough Baking Unit Comprising Two Articulated Metal Belts Forming Tubular Baking Chamber, Means for Introducing and Baking Dough, Venting Steam—W. *Bahlsen, Hannover, Germany.* No. 2,678,614. *May 18, 1954.*

Egg Grading Machine Employing Weighing Pan Equipped With Snubber Plate To Slow and Abutment To Stop Movement of Rolling Egg—R. C. *Root, Columbus, Ind.* No. 2,678,726. *May 18, 1954.*

Double Stage Sediment Tester Comprising Funnel, Filter, Discharge Sections in Axial Alignment, Transverse Slots in Filter Section and Means for Supporting Roll of Filter Material.—T. J. *Claydon* and J. J. *Smalts, Manhattan, Kan.* to Research Corp., New York City. No. 2,679,158. *May 25, 1954.*

Egg Aligning Device Consisting of Moving Surface With Guide Strips Spaced to Receive Plurality of Eggs and Discharge Them Single File—W. J. *Reading, Ottumwa, Iowa.* No. 2,679,309. *May 25, 1954.*

Nut Coating Machine Comprising Constant Speed Feed Conveyor Above Intermittently Timed Peanut Covered Conveyor, Means for Transferring Candy Bar From Upper to Lower and Pressing Bars Into Peanut Beds.—S. C. *Petrilli* to General Candy Corp., Chicago. No. 2,679,820. *June 1, 1954.*

Bag Dipping Machine Composed of Open Top Vat, Vertically Moving Dipping Member With Horizontal Conveyor, Feed and Discharge Conveyors Timed With Moving Means of Dipping Member—L. E. *Erie, Rock Island, Ill.* No. 2,679,852. *June 1, 1954.*

Biscuit Stacking Device Comprising Two Plates Within and Linked to Open End Hopper Enabling Lateral Movement, Means for Moving Plates Together at Top, Opening Bottom Space—A. C. *Page, Tynemouth, England* to Wright's Biscuits Ltd., *South Shields, England.* No. 2,680,528. *June 8, 1954.*

Regenerative Heat Exchanger Comprising Stationary Housing With Adjacent Flow Channels, Rotor With Radial Partitions Containing Spaced Plates and Ports for Admitting and Exhausting Coolant—S. I. *Trulsson, Enskede*, and H. R. Wilsson, *Ektorp, Sweden* to J. C. *Marble, New York City*, L. M. *Merrill, Westfield, N. J.*, P. H. *Batten, Racine, Wis.* No. 2,680,598. *June 6, 1954.*

Container Cleaning Apparatus Consisting of Rotatable Brush and Guide Roll, Stationary Support Whereby Containers are Cradled, Guide Member, Guide Roll.—G. W. *Baker, Milwaukee*, and A. M. *Olson, Wauwatosa, Wis.*, to Chain Belt Co., Milwaukee. No. 2,680,866. *June 15, 1954.*

Conveyor for Feeding Fish to Dressing Machines Comprising Supporting and Guiding Means, Pushing Member, Means of Retracting Same, Synchronized Drive, Locking Means—N. L. *Oates* to Smith Cannery Mach. Co., Seattle, Wash. No. 2,680,876. *June 15, 1954.*

Fish Steaking Device With Frame, Knife-Guiding Means and Gripper

Model TA has *What it Takes* to do TOUGH mixing

DESIGNED FOR EXTRA HEAVY MIXING

AGITATOR PARTS QUICKLY REMOVABLE FOR EASY CLEANING

GROEN STAINLESS STEEL STEAM JACKETED TWIN-SHAFT MIXER KETTLE

IT'S A RUGGED, SANITARY UNIT

• Stainless steel from top to bottom. Completely sanitary — conforms to the most rigid Health Dept. requirements. Twin shaft operation for highest efficiency in mixing. Fully enclosed motor drives two shafts: (1)—at slow speed operating Flexible Finger-Like scrapers; and (2)—a secondary high-speed shaft equipped with any of a variety of beaters, blenders or mixers.

• Demountable shaft couplings permit entire agitator assembly to be removed in a few seconds for easy cleaning, and as quickly reinstalled. Cannot disengage in operation. And couplings equal strength of a solid shaft. Read all about this widely famous mixer in Bulletin TAK-2. Write for it now.

ASK US ABOUT THE HIGH SPEED ROTA-THERM JACKET

Attains fastest cooking speed ever produced by any kettle! Multiple steam inlet design develops high velocity steam circulation instantly. No air pockets . . . no cool areas, possible. Gives all advantages of stainless steel plus swiftest operation. Ask for Bulletin RT-1.

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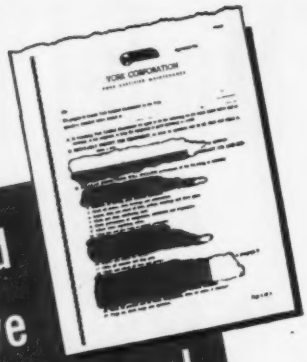

You could hardly have made a more liberal contract if you'd written it yourself!

It's the YORK CERTIFIED MAINTENANCE CONTRACT, and it was called "fantastic" by competitors when it was introduced twelve years ago!

Here's how it works . . .

You pay only a nominal, agreed-on-in-advance fee. York assigns a factory-trained Maintenance Engineer to inspect your equipment *regularly*. In addition, York *guarantees* to keep that equipment in good operating condition, and to furnish all supplies, repairs and replacement parts and labor without further charge to you. This includes emergency service!

Look at just a few of the things your York Engineer does . . .

- FURNISH EMERGENCY SERVICE between regular inspections.
- MAKE ANY REPAIRS OR ADJUSTMENTS REQUIRED to provide satisfa
- FURNISH AND INSTALL ALL NECESSARY REPAIR PARTS, REFR LIES, including freight and cartage.

1. Check equipment for leaks, repair any found.
2. Check refrigerant charge, add refrigerant if needed.
3. Check oil in compressors and other equipment, add York Oil if needed.

11. Clean water-cooled condensers once a year.
12. Check and adjust refrigerant controls.
13. Check and adjust safety controls.
14. Check operation of capacity reduction devices.
15. Examine compressors internally if necessary, make any repairs needed.

19. Paint equipment to protect it from deterioration.
20. Make seasonal adjustments and/or start up and shut down equipment per schedule.
21. Drain water from all parts of system likely to freeze at end of cooling season.
22. Clean steam traps (air conditioning only).
23. Clean evaporator coils and/or dehumidifiers, check and clean spray nozzles.
24. Check and adjust controls and dampers for correct temperatures and air distribution.
25. Inspect air filters; clean or replace as necessary.

Testimonials to this service are all around you!—there are more than 7800 York Certified Maintenance Contracts in effect today! Details are yours for the asking—without obligation, of course. Contact your York District Office (located in principal cities) or write to A. E. & M. Dept.

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HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885

—*M. H. Thornton, St. Paul, Minn. No. 2,680,877. June 15, 1954.*

Fish Holder Having Blade, Slide Member With Claw Affixed.—*L. F. Pomrenke, ½ to A. I. Nickel, Trenton, Mich. No. 2,680,878. June 15, 1954.*

Baking Oven With Long Tunnel Having Horizontal Division, Endless Belt, Heating Elements—*D. J. Boal to Spivey Co., Inc., Philadelphia. No. 2,681,017. June 15, 1954.*

Continuous Fruit Pitter With Receiving Cups Advanced by Conveyor, Pitting Plunger and Motion Components—*R. F. Krupp and F. Leavitt, San Lorenzo, Calif., to Gerber Products Co., Fremont, Mich. No. 2,681,088. June 16, 1954.*

Olive Pitter and Stuffer Having Loader, Compartments, Coring Knife, Pitting Punch, Stuffing Tube With Piston, Rotatable Buffer and Ejector, Whole Employing Compartmented Carrier.—*M. E. Francisco, San Jose, Calif. No. 2,681,089. June 15, 1954.*

Conveyor System for Bakeries Having First and Second Horizontal Driven Conveyors at Right Angles, Means for Transfer—*J. L. Atwood, Nashville, Tenn. No. 2,681,130. June 15, 1954.*

Bag Closing Mechanism Comprising Movable Member With Compartment for Filled Bag, Conveyor for Reception of Closed and Sealed Bag and Means for Imparting Motions—*H. V. Kindseth and F. L. Hopkins to Bemis Bro. Bag Co., Minneapolis, Minn. No. 2,681,133. June 15, 1954.*

Belt Cleaning Device Consisting of Support Having Wire Under Tension and Means of Varying Tension—*S. H. Davis, Philadelphia. No. 2,681,137. June 15, 1954.*

Container-Carton Unloader With Endless Conveyor Having Low Level Position, Support for Cartons Beneath, Engaging Devices Corresponding in Number and Location to Containers—*E. H. Lorenz and T. Waugh, West Hartford, Conn. to Emhart Mfg. Co., Hartford, Conn. No. 2,681,161. June 15, 1954.*

Mixer and Blender Comprising Outer Casing, Means for Rotating Same, Inner Housing Having Openwork Construction and Plurality of Grinding Balls—*A. J. Schaefer, Stroudsburg, Pa. No. 2,681,210. June 15, 1954.*

Doughnut Mold Comprising Rigid Outercup, Rotatably Mounted Inner Cup That Acts as Cutter and Releasing Means—*R. J. Babbitt, Cleveland, Ohio. No. 2,681,625. June 22, 1954.*

Potato Slicing Machine Consisting of Knife Carrier Member With Thin Corrugated Blade Mounted at Angle Thereon to Form Slot Through Which Slices Pass—*B. Stahmer, Omaha, Neb. No. 2,681,674. June 22, 1954.*

Hog Side Skinning Machine Feed Table Swingably Mounted so it can be Advanced and Tilted Downward Close to Surface of Revolving Skinning Drum, Means for Advancing in Timed Relationship With Drum—*P. F. Burch, to Wolverine Shoe & Tanning Corp., Rockford, Mich. No. 2,681,675. June 22, 1954.*

PACKAGING

Grease-Resistant Porous Wrapper, Comprising Vapor-Transmitting Yarns Interspersed With Hydrophobic Plastic—*W. Wade, Rosemont, Pa. to American Viscose Corp., Wilmington, Del. No. 2,682,097. June 29, 1954.*

Flexible Adhesive Wrapper Applied to Wax-Coated Rindless Cheese to Peel off Wax as Wrapper is Withdrawn—*D. P. Smith, to Milprint, Inc., Milwaukee, Wis. No. 2,682,475. June 29, 1954.*

Cover for Barrel-Type Container With Collapsible Head Comprising Flanged Cap With Vent Channels—*G. R. Brothers, Jr., to Lerio Corp., Mobile, Ala. No. 2,682,970. July 6, 1954.*

Whipped Cream Dispenser Having Conduit Forming Means, Communicating, Discharge Ducts—*N. E. Spiess, Jr., Oakdale, and L. C. Widdoes, Bohemia, N. Y., to National Dairy Research Laboratories, Inc., Islip, N. Y. No. 2,682,977. July 6, 1954.*

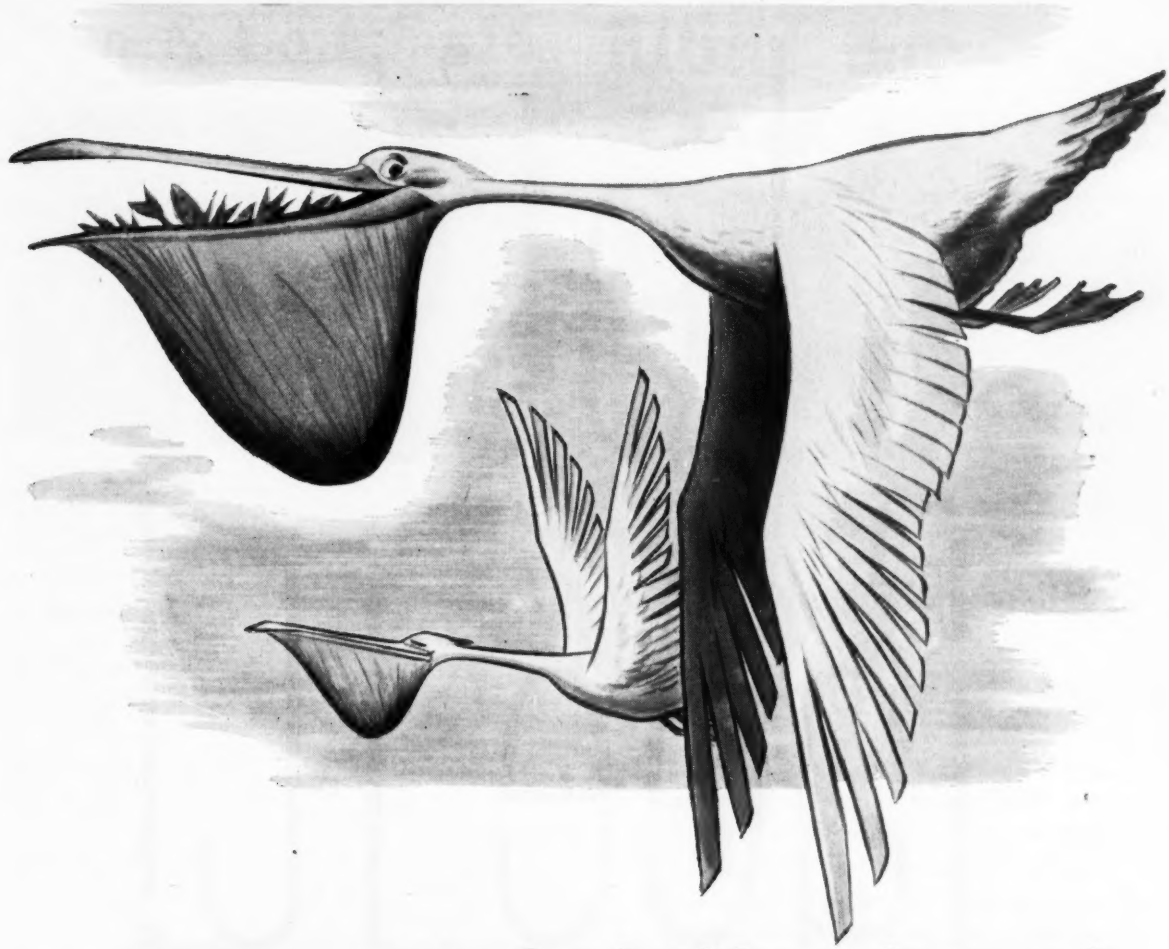
Frozen Products Container Comprising Bottom, Side Walls, Detachably Secured Cover of Insulating Material, Top Wall of High Conductvity Metallic Sheet—*N. E. Spiess, Jr., to National Dairy Research Laboratories, Inc., Islip, N. Y. No. 2,682,987. July 6, 1954.*

Elongated Block-Ended Packet With Side Folds, Tucks—*D. R. P. Jackson, Deptford, to Molins Machine Co., Ltd., London, England. No. 2,682,989. July 6, 1954.*

Self-Heating Container With Outer Non-Metallic Jacket, Insulated Liner, Heat Generating Material, Inner Food Can—*M. Katz, Los Angeles, to United Food Services, Inc., Wilmington, Del. No. 2,683,449. July 13, 1954.*

Container With Tray-Like Body Member Adapted as Baking Dish—*C. D. Rice, to Sutherland Paper Co., Kalamazoo, Mich. No. 2,683,561. July 13, 1954.*

Want more information on any of these recent patents? If so, you may obtain detailed printed copies by writing direct to the U. S. Patent Office, Washington, D. C., giving serial numbers of those you want and enclosing 25¢ for each copy.



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To answer a question with a question, "How *do* you pump food?"

That was the question asked by engineers faced with pumping fruit, fish and other easily bruised foods. They asked the world's largest pump manufacturer for the answer.

Fairbanks-Morse design engineers gave them the first bladeless impeller pump—the pump with the whirling tube that pumped not with blades—but with centrifugal force.

Whenever a pumping problem arises—be it for a vertical or horizontal, centrifugal, rotary, turbine or propeller pump—the engineers of the world seek the solution supplied by Fairbanks-Morse design engineers. For only from Fairbanks-Morse do you get originality of engineering and design that assures you such outstanding performance.

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BOMBS...OR FIRE...OR FLOOD...OR TORNADO ...you can handle them if you act now.

Let's face it... the threat of war and the atomic bomb has become a real part of our life—and will be with us for years. Fires, tornadoes and other disasters, too, can strike without warning.

Whatever the emergency is, everybody's going to want help at the same time. It may be hours before outside help reaches you. The best chance of survival for you and your workers—and the fastest way to get back into production—is to know what to do and be ready to do it. Disaster may happen TOMORROW. Take these simple precautions TODAY:

☐ **Call your local** Civil Defense Director. He'll help you set up a plan for your offices and plant—a plan that's safer, because it's integrated with community Civil Defense action.

☐ **Check contents** and locations of first-aid kits. Be sure they're adequate and up to date. Here, again, your CD Director can help. He'll advise you on supplies needed for injuries due to blast, radiation, etc.

☐ **Encourage personnel** to attend Red Cross First-Aid Training Courses. They may save your life.

☐ **Encourage your staff** and your community to have their homes prepared. Run ads in your plant paper, in local newspapers, over TV and radio, on bulletin boards. Your CD Director can show you ads and official CD films or literature that you can sponsor locally. Set the standard of preparedness in your plant city. There's no better way of building prestige and good community relations—and no greater way of helping America.

Act now . . . check off these four simple points . . . before it's too late.

Men & Companies

Omar Incorporated, plant-to-home bakery firm, names three new officials: **Frank J. Wear** (left) has been appointed vice-president in charge of operations; **James A. McBride, Jr.,** is vice-president and secretary-treasurer; and **Ross Davis** is vice-president in charge of sales.

Industry

Ace Dairy Foods, Inc., has opened a new factory in East Boston, Mass., for manufacture of cream cheese, cottage cheese and other products.

American Bakeries' new $1.5 million plant in Anderson, S. C. is reported to be now in full operation.

American Food Labs., Brooklyn, has announced the addition of an annex to their present facilities.

Blue Bell Potato Chip Co. will begin construction soon on a new $200,000 factory in Portland, Ore.

California Packing Corp. has completed plans to produce frozen concentrated pineapple juice for Minute Maid Corp. at Calpak's new Hawaii plant.

Campbell Soup Co., Camden, N. J., has leased the Lucerne Park, Fla., plant of Di Giorgio Fruit Co. for possible expansion of its "FR-8" fruit juice production.

Canadian Concord, Ltd., Montreal, has been purchased by private interests and will be given a new name.

Candyland, Inc., Sioux City, Ia., marshmallow manufacturers, has been acquired by Kraft Foods, Inc.

Christie Brown & Co., Ltd., is now reported near completion of its $2 million enlargement and improvement program in Winnipeg, Man.

Eldridge Packing Co., Kansas City, Kan., has been incorporated for $50,000.

Foremost Dairies, Inc., raised its dividend on common stock from 35 to 40 cents a quarter and proposed to split the common stock three for one.

General Foods Corp. is reported considering building $1.5 million plant in Toledo.

Golden Age Beverages Ltd. is building a factory and warehouse in Brandon, Man. to cost over $250,000.

Golden Grain Macaroni Co. has announced plans to build a $150,000 addition to its San Leandro, Calif., plant.

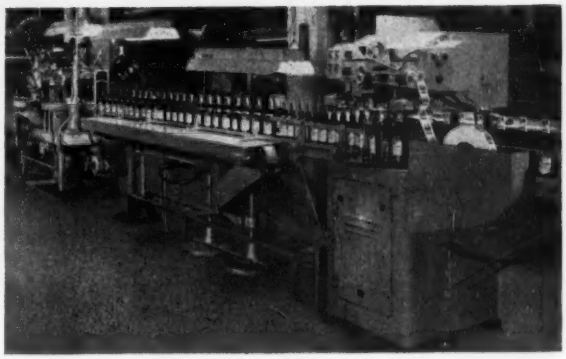
J. C. Grant & Son, Inc., Clinton, Me., vegetable canner, has taken over the Portland Packing Co.'s factory in Albion, Me.

Highgrade Food Products Corp., Buffalo, announced that their $500,000 expansion program will be completed shortly.

Hirzel Canning Co., Toledo, has purchased the plant of Pemberville Food Co., for about $50,000.

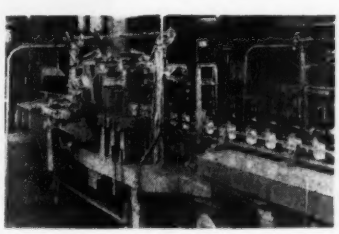
Charles A. Joyce is new executive assistant to the general manager of Glidden Co.'s Durkee Famous Foods Div.

RIGHT ON THE LINE AT PARK & TILFORD



WORLD BEE-LINE LABELER to WORLD CELLULOSE BANDER

Banding as well as labeling is now a fully automatic, uniformly precise, high production, low labor cost operation at Park & Tilford Distilling Corporation, New York. The same efficient, dependable, economical performance that has caused so many manufacturers of nationally famous whiskeys, wines, condiments, foods, drugs, cosmetics and household products to standardize on the Bee-Line Labeler makes the World Automatic Cellulose Banding Machine an ideal production teammate.



For recommendations and for cost and delivery estimates, get in touch with us.

Close-up of the WORLD BEE-LINE LABELER at Park & Tilford. The Bee-Line is recommended for simultaneous application of front and back body labels, neck labels, or shoulder labels or medallions. It comes in several models to meet a wide range of production needs.

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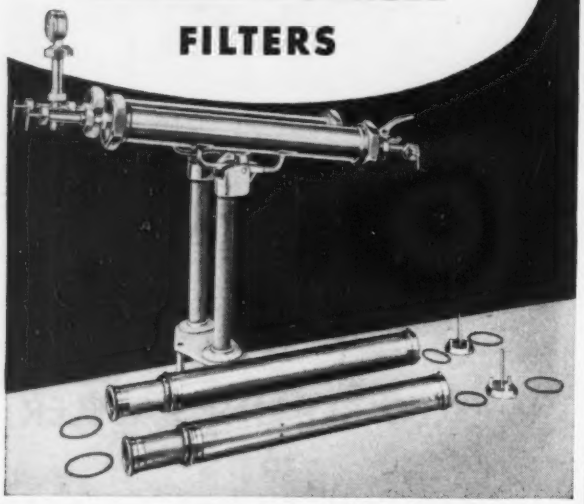
If Liquids Flow AT ALL

They'll Flow Clean Through

CHERRY-BURRELL FILTERS



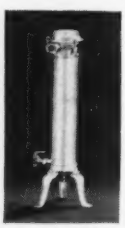
"PCF" Pressure Filters: Pressure tight tubes, two stainless steel screens with *circular* holes positively screen out sediment. No product by-passing. No copper to copper surfaces to give product oxidized flavor. Easy to take apart and clean. Operate in vertical, inclined or horizontal positions.

Three models Cherry-Burrell "PCF" single and double tube filters. Capacities to 20,000 lbs. per hr. depending on product and type screen used.

No. 3 Filter
2000 lbs. per hr.

Standard Pipe Line Filters: Designed for capacities up to 2000 lbs. per hr. Cherry-Burrell Nos. 1½ and 3 Filters fit any standard pipe line—operate either horizontally or vertically. Easy to dismantle. Stainless steel outer body and perforated filter screen; cotton filter bags fit snugly over filter screens. May be used without cloths.

Vertical Floor-Mounted Filter: Capacities to 12,000 lbs. per hr. Designed for high-capacity filtering or straining. Several grades of cloth available. Filters can be provided with either a coarse screen supporting filter cloth or with coarse and fine screens for two-stage straining.



No. 12 Filter
12,000 lbs. per hr.

Ask your Cherry-Burrell Representative for complete details about these filters. Or write:

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Equipment and Supplies for Industrial and Food Processing

FACTORIES, WAREHOUSES, BRANCHES, OFFICES OR DISTRIBUTORS AT YOUR SERVICE IN 56 CITIES

Clifford F. Evers has been appointed technical service director for Amino Products Division, International Minerals & Chemicals Corp. Mr. Evers is one of the original pioneers in frozen food research and author of numerous books and articles on the subject.

International Milling Co., Minneapolis, has purchased the Cleveland, Ohio, facility of Montana Flour Mills Co.

Jack's Tasty Snack Corp., Oneida, N. Y. has opened a new branch plant at Terre Haute, Ind.

Kellogg-Pillsbury of Canada Ltd. has acquired a factory in London, Ont. which is now being renovated for future manufacturing.

Lucas Brands Foods has bought a 20,000 sq. ft. plant in New Bedford, Mass.

Lucky Lager Brewing Co. has anounced a $4,125,000 expansion program of its facilities with the addition of five new brewery buildings in San Francisco.

Manitoba Sugar Co. is erecting a $100,000 warehouse in Fort Garry, Winnipeg suburb.

D. W. Mikesell Co., manufacturer of potato chips and popcorn, has purchased a tract in Dayton, Ohio, where it will build a $350,000 factory.

Peck Foods, Inc., has purchased Rood & McLean Fruit Processing Co. plant for $150,000 and is planning a further expansion program.

Pepsi-Cola Bottling Co., Wilmington, Del., has opened a plant to serve neighboring areas of Delaware, Penna., and N. Jersey.

Plat Packing Co. is completing a $65,000 addition to its meat packing plant in Denver, Colo.

Reo Foods, Inc., will place its new meat packing facility in W. Des Moines, Iowa, in operation this Sept.

S&W Fine Foods, Inc. announced purchase of ten-acre site in San Francisco for construction of new office headquarters and warehouse and coffee processing plant, with cost estimated in excess of $2,500,000.

Schafer's Bakeries, Detroit, were granted their petition in Federal Court for voluntary reorganization of their six corporations.

Standard Brands Inc. has completed preliminary negotiations to acquire all outstanding stock of Kendall Foods, Inc., of Los Angeles.

Swift & Co. plans to erect a branch factory in Buffalo.

White Rock Canning Co.'s new Denver soft drink canning plant will begin production on Oct. 1.

Personnel

Herbert C. Cornuelle has been appointed to the newly-created post of assistant to the president of Dole Hawaiian Pineapple Co.

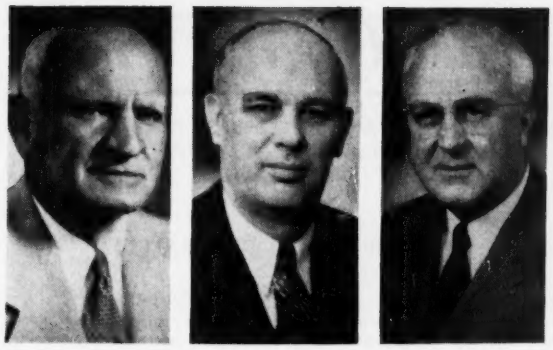
Robert W. Fay of Marion, Ohio, has been named manager of Central Soya Co., Inc. and the McMillen Feed Mills plant now under construction in Chattanooga.

Clarence Francis, director of General Foods Corp. has been elected a director of Lehman Corp., New York City.

H. A. Greenberg has been elected president of Dottie's Quickie Cookie Co., newly-formed Atlanta, Ga., corporation.

Frederick C. Hitchcock, formerly in charge of Maxwell House Div. of General Foods, has become vice-president of Thomas Laughlin Co., Portland, Me.

Miss Janet A. Ball, formerly food technician with General Foods, is new home economist for Hines-Park Foods, Inc. She will also assist in research and product development of Duncan Hines foods.



Three new executives elected by Gerber's Baby Foods are (left to right): **Fred S. Wyatt,** vice-president and director of Produce Division; **Stephen S. Nisbet,** vice-president and director of Public Relations; and **Joseph H. Bagley,** vice-president and general sales manager. All three were advanced from within the company.

Norman W. Kempf, is new manager of chocolate development for Walter Baker Chocolate & Cocoa Div., Dorchester, Mass.

Arthur L. Koenig has been appointed Maxwell House Div., (General Foods) plant manager at Hoboken, N. J.

George P. Larrick has been named Commissioner of the Food and Drug Administration.

Dr. Raymond J. Lemieux, famed for first succeeding in synthesizing sugar and Director of Chemistry Section, Natl. Research Council of Canada, has been named Chairman of Chemistry Dept., University of Ottawa.

Roscoe Long has been promoted to senior chemical engineer for A. E. Staley Mfg. Co., corn and soybean processor.

Herbert S. Manning is new vice-president and treasurer of J. S. Hoffman Co., Chicago packers of canned meats and cheeses.

John C. McMullen has been elected president and managing director of Weston Biscuit Co., Inc.

R. T. Monrad has been elected vice-president of Chr. Hansen's of Canada Ltd., and will also continue as general manager.

Joseph D. Mossak is new vice-president of Everkrisp Food Products, Inc., Detroit.

Dr. Laszlo Reiner has been appointed staff consultant to Food Research Labs. to deal with problems on food, drug and cosmetics.

M. J. Swortfiguer has accepted an interim position with the Bakery Service Div. of American Dry Milk Institute, Inc., Chicago.

Allied Industries

Bemis Bro. Bag Co.'s multiwall paper shipping sack manufacturing plant has started operations at Wilmington, Calif.

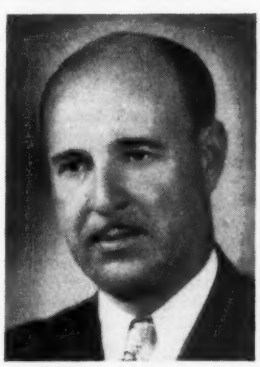
Cherry-Burrell's director and chairman, Loomis Burrell, announced his resignation, and will be succeeded as chairman by Howard H. Cherry.

Dewey & Almy Chemical Co. and W. R. Grace & Co. directors have announced a proposed merger.

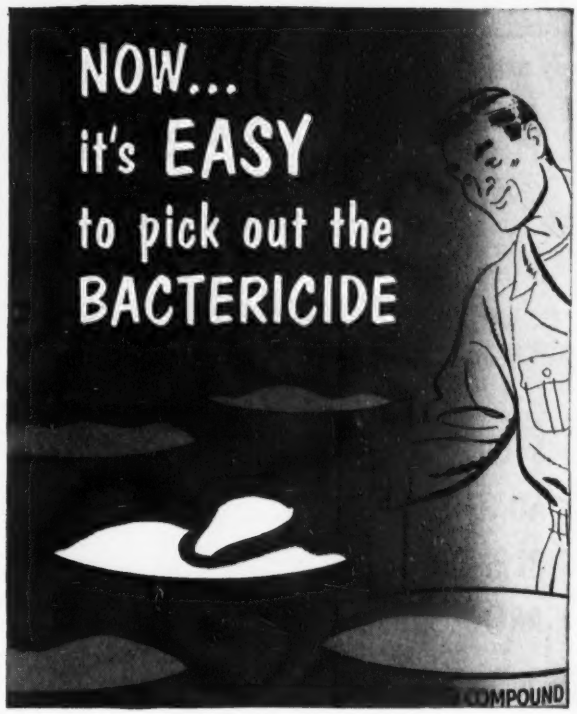
General American Transportation Corp., Chicago, has contracted to acquire Fuller Co., Catasauqua, Penna., designer and manufacturer of pneumatic conveying systems for dry bulk materials handling.

Permatex Co., Inc., has formed a special industrial sealant research group.

Rheem Mfg. Co.'s new vice-president and director is Lt. Gen. Albert C. Wedemeyer.



O. N. Koenig has been named district chairman of Borden Co.'s Chicago-Central District, to have supervision over the company's fluid milk and ice cream operations in Illinois.



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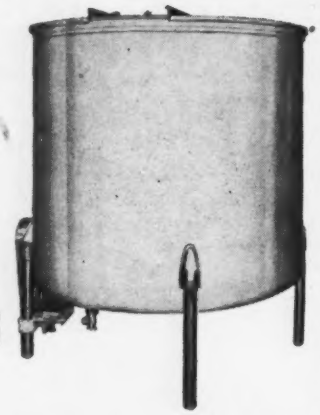

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FOOD PLANT EQUIPMENT

Oil Burners

Description and illustrations of belt driven horizontal rotary type heavy-oil burners. Bulletin 175-H. 8 p.—*Preferred Utilities Mfg. Corp., 1860 Broadway, New York City 23.* (250A).

Woven-Metal Belts

Types of woven wire belts adapted for special uses, with photos. Bulletins A, F, G, and 51. Each 4 p.—*Audubon Wire Cloth Corp., Richmond St. & Castor Ave., Philadelphia.* (250B).

Valve Control

Design, selection and installation of flexible shafting for remote control of valves and equipment actuated by rotating shafts. Catalog 852-5M. 16 p.—*Stow Mfg. Co., Binghamton, N. Y.* (250C).

High Pressure Valves

Information on solenoid valves for high pressure applications. Bulletin 201. 4 p.—*Atkomatic Valve Co., Inc., 545 W. Abbott St., Indianapolis 25.* (250D).

Air Compressors

Four models of miniature, lightweight, high pressure air compressors. Bulletin 554-10M. 4 p.—*Cornelius Co., 550 39th Ave., N.E., Minneapolis 21.* (250E).

Corrosion Resistant Pipe

Information on chemical resistant features of three thermoplastic construction materials for pipe, fittings, tubing, etc. 20 p. booklet.—*American Agile Corp. P. O. Box 168, Bedford, Ohio.* (250F).

Vacuum Cleaning Systems

Features and applications of stationary vacuum cleaning systems with accessories. Form A-939-17M. 12 p.—*U. S. Hoffmann Machy. Corp., 105 Fourth Ave., New York City 3.* (250G).

Wrapper Model

Medium-speed bread wrapper for medium production requirements. Bulletin DM-1219. 4 p.—*Amer. Machine & Foundry Co., 261 Madison Ave., New York City 16.* (250H).

Cooking Kettle

Features of stainless steel cooker with agitator fixture, in capacities of 30 to 500 gal. Data Sheet H-14.—*Hamilton Copper & Brass Works, 820 State Ave., Cincinnati.* (253I).

Pipe & Fittings

Jacketed pipe and fittings of cast iron, cast steel, welded steel for maintaining uniform temperatures in process pipes. Bulletin J-50. 8 p.—*Heatherington & Berner Inc., 701-745 Kentucky Ave., Indianapolis 7.* (250J).

Advance Trapping

Description of steam traps, including installation data. Bulletin.—*Yarnall-Waring Co., 127 Mermaid Co., Philadelphia 18.* (250K).

Piston Fillers

Operational features of rotary piston filler. Booklet 911. 6 p.—*Pfaudler Co., Dept. FE-9, Rochester 3, N. Y.* (250L).

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Design features of two-row velocity stage turbines with illustrations. Bulletin 4202. 4 p.—*De Laval Steam Turbine Co., Trenton 2, N. J.* (250N).

Steam Traps

Reference on advance-type trapping of steam, air and other mediums. Catalog 953. 32 p.—*W. H. Nicholson & Co., 193 Oregon St., Wilkes-Barre, Pa.* (250O).

Dust Collector

Details of construction and operation of reverse jet dust collector. 12 p. booklet.—*Western Precipitation Corp., 1016 W. 9th St., Los Angeles 15.* (250P).

Separator Unit

Information on centrifugal separators. Bulletin 087.—*Sturtevant Mill Co., 105 Clayton St., Boston 22, Mass.* (250Q).

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Features of flexible plastic tubing and uses in fluid handling. Bulletin T-87. 24 p.—*U. S. Stoneware Co., Akron 9, Ohio.* (250R).

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Features of gluing-sealing unit. Bulletin PO1492.—*Chisholm-Ryder Co., Hanover, Pa.* (250S).

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Information on pump models featuring leak-proof mechanical

seals. Bulletin SP-336.—*Viking Pump Co., Cedar Falls, Iowa.* (250T).

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Information on kinds of folding cartons, carton sealing machines, and use of adhesives. Bulletin 24. —*Paisley Products Inc., 630 W. 51st St., New York City 19.* (251A).

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Description of units for dust control. Bulletin 528R.—*Day Co., 817 Third Ave., N.E., Minneapolis 13.* (251B).

Trap Line

Line of steam traps, temperature controls and heating specialties. Bulletins. — *Sarco Co., Empire State Bldg., New York City 1.* (251C).

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Design features and uses of wire process belts. Catalog E 52.—*Ashworth Bros., Inc., Worcester, Mass.* (251D).

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Data on various filler models. Circular.—*F. L. Burt Co., 571 7th St., San Francisco, Calif.* (251E).

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Information on slitters and other cutting equipment. Catalog 36-A. —*E. W. Bliss Co., 50 Church St., New York City 7.* (251F).

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Illustrated description of line of thermocouple wire and thermocouple extension wire. Form 1200-7-54. 4 p.—*Claud S. Gordon Co., 3000 W. Wallace St., Chicago 16.* (251G).

Motor Reducers

Selection tables, dimensions, weights, load and capacity ratings of horizontal, vertical, or right angle motor reducers. Bulletin 3100. 28 p.—*Falk Corp., 3001 W. Canal St., Milwaukee 8.* (251H).

Magnetic Separators

Illustrated models of electro and non-electric magnetic pulley type separators. Catalog 602-4. 6 p.—*Magnetic Engineering & Mfg. Co., Clifton, N. J.* (251I).

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Description of equipment for control of air temperature and moisture, with photos and diagram. Bulletin 122. 8 p.—*Niagara Blower Co., 405 Lexington Ave., New York City 17.* (251J).

Valve Actuators

Illustrated data on tandem type actuators for valves requiring relatively high torques, and floating bar type actuators for valves requiring lower operating torques. Bulletin 3020. 8 p.—*Leeden Mfg. Co., 1600 So. San Pedro St., Los Angeles 15.* (251K).

Liquid Chillers

Models of packaged liquid chillers which can be tailored to exact individual requirements. Bulletin 220. 4 p.—*Acme Industries, Inc., Jackson, Mich.* (251L).

Dust Control Models

Various models of dust and fume collectors described and illustrated, with specifications tables and dimensions, diagrams. Catalog 372. 8 p.—*Amer. Wheelabrator & Equipment Corp., Mishawaka, Ind.* (251M).

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Illustrated description of plate type evaporators, bank and stand units, conversion plates and engineering data. Also 12-company report on how plate-type refrigerating equipment has replaced coils. Bulletins 153 & 154. Each 16 p. —*Tranter Mfg. Inc., Lansing, Mich.* (251N).

Compact Pumps

Design and construction features with sectional and external views of centrifugal, reciprocating and rotary pumps. Bulletin 247. 4 p.—*Warren Steam Pump Co., Inc., Warren, Mass.* (251O).

Hydraulic Drives

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Heating Systems

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Wire Cloth Products

Illustrated uses of fabricated woven wire cloth. Bulletin 111. 4 p.—*Cambridge Wire Cloth Co., Cambridge, Md.* (251R).

Miscellaneous Equipment

Condensed description and photos of equipment available, including feeders, separators, crushers, conveying machinery, chains and sprockets, etc. Bulletin 832B 44 p.—*Jeffrey Mfg. Co., Columbus 16, Ohio.* (251S).

Motor Pulleys

Construction details, lubrication and selection data, and controls available for redesigned line of motor pulleys. Catalog V-545. 28 p.—*Reeves Pulley Co., Columbus, Ind.* (251T).

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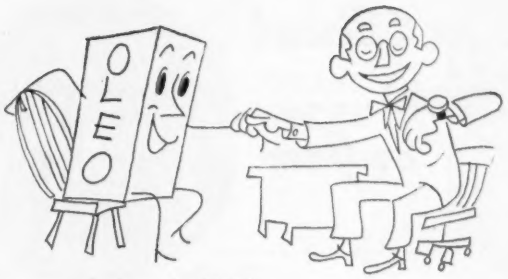

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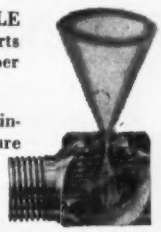
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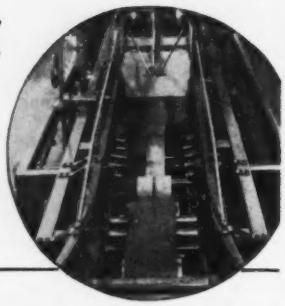

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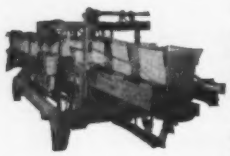

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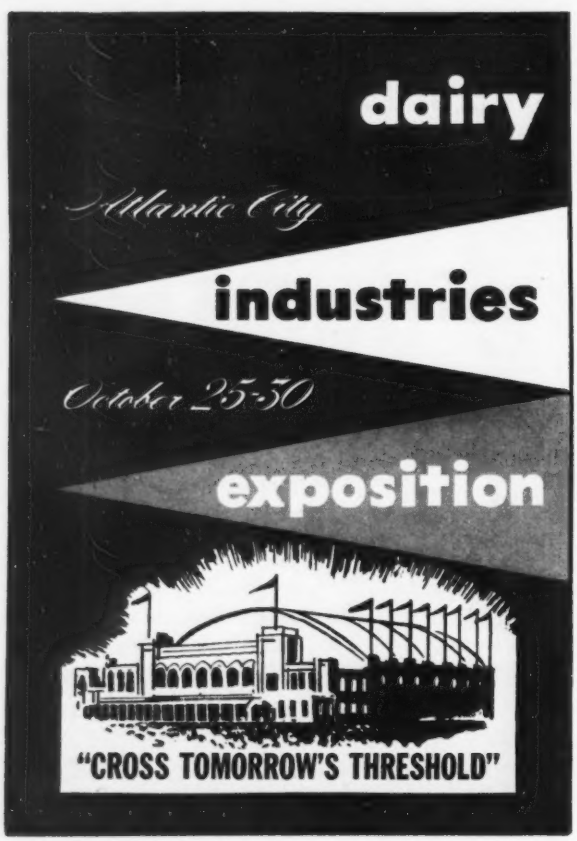

MATERIALS HANDLING

Milk-Handling Equipment

Variety of dollies and floor trucks for easier handling of milk cases, barrelled products, crates and cartons. Bulletin 54-DJ. 8 p. —*Nutting Truck & Caster Co., 1468 W. Division St., Faribault, Minn. (252A).*

Industrial Trucks

Illustrated features of fork and ram trucks, platform and crane trucks with selection specification tables. Catalog 54-A-40M. 4 p.—*Baker Raulang Co., 1260 W. 80th St., Clevaland. (252B).*

Conveyor Belting

Information on selection of types of conveyor belts. Catalog 3679.—*Thermoid Co., Trenton, N. J. (252C).*

Miscellaneous Items

Comprehensive line of materials handling equipment including several new steel boxes and stands, racks, grabs, cradles. 48 p. catalog. —*Palmer-Shile Co., 16000 Fullerton Ave., Detroit 27. (252D).*

Electric Truck

Details on electric fork truck designed for close-quarter operation. Bulletin 5001. 4 p.—*Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15. (252E).*

Specialized Handling

Presentation of line of miscellaneous materials handling equipment for institutions (Bulletin 53-SC) and for hotel and restaurant equipment (Bulletin 53-HR). 4 & 6 p.—*Nutting Truck & Castor Co., 1460 Faribault St., Faribault, Minn. (252F).*

Floor Trucks

Illustrated line of all-purpose floor trucks, wheels, castors. Bulletin 53-SR. 16 p. & Catalog 54G. 12 p.—*Nutting Truck & Caster Co., 1469 W. Division St., Faribault, Minn. (252G.)*

Pallet Loader

Photo presentation of machine for loading pallets in various patterns. 8 p. brochure.—*Alvey Conveyor Mfg. Co., 9301 Olive Road, St. Louis 24. (252H).*

Aluminum Trucks

Weight, flexibility and caster advantages of aluminum industrial trucks. Data File.—*Magnesium Co. of America, Tobey Alum. Div., E. Chicago, Ind. (252I).*

Dragline Truck

Description of dragline trucks for both in-floor and overhead conveyor lines. Circular 29-A. 4 p. —*Lewis Shepard Products, Inc., Dept. R-52, Watertown, Mass. (252J).*

Gas Trucks

Features of series of gasoline fork lift trucks with fluid coupling. Bulletin 5013. 8 p.—*Yale & Towne Mfg. Co., Materials Handling Div., Philadelphia 15. (252K).*

Electric Fork Trucks

Series of photos with explanations of anatomy, operation and maintenance of electric fork trucks. Book 64. 12 p.—*Baker Raulang Co., 1250 W. 80th St., Cleveland, Ohio. (252L).*

Overhead Conveyors

Revised information on overhead materials handling equipment, including track drives, cranes, buckets, grabs, electrification, etc. Booklet 2008-K. 12 p. —*Cleveland Crane & Engineering, Tramrail Div., Wickliffe, Ohio. (252M.)*

Speed Controller

Detailed data on magnetic contactor unit and master accelerating switch for controlling speed, designed to fit all makes of electric trucks. Bulletin 1599.—*Yale & Towne Mfg. Co., Philadelphia 15. (252N).*

CONTROL EQUIPMENT

Hand Tachometer

Features of double range hand tachometer with stop button. 2 p. leaflet.—*Jones Motrola Corp., 432 Fairfield Ave., Stamford, Conn. (252O).*

Process Timer

Detailed description of operation, advantages, and applications of process timer, with illustrations. Bulletin GEC-1223. 8 p.—*General Electric Co., Schenectady, N. Y. (252P).*

Flow Meters

Illustrations and features of types of flow meters, including indicating, recording, integrating and controlling of both evenly graduated and square root types, area meters and differential converters. Catalog 2320. 60 p.—*Minneapolis-Honeywell Reg. Co., Wayne & Windrim Aves., Philadelphia 44. (252Q).*

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catalog.—*General Electric Co., Trumbull Components Dept., Plainville, Conn.* (252S).

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Line of liquid level gages and data and specifications. Catalog 236, 8 p.—*Jerguson Gage & Valve Co., 80 Fellsway, Somerville 45, Mass.* (253A).

Test Cabinets

Environmental test cabinets for JAN and MIL tests, product evaluation, and research activities. Data Sheet 11.0-8.—*Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia 44.* (253B).

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Electron Microscopes

Design and operating information of electro-microscopes with forty-four typical applications. 4 p. folder.—*North American Philips Co., Inc., 750 S. Fulton Ave., Mt. Vernon, N. Y.* (253D).

Control Instrumentation

Description and illustrations of line of meters and controls. Bulletin 17-F. 16 p.—*Bailey Meter Co., Cleveland 10.* (253E).

Water Baths & Incubators

Features of incubators, paraffin embedding ovens, constant temperature serological water baths and inspissators. Catalogs 100, Sec. 2 & 3. 8 p. each.—*Chicago Surgical & Electrical Co., 217 N. Desplaines St., Chicago 6.* (253F).

Telemeters Line

Line of telemeters and accessories with information and illustrations on how they may be applied. Bulletin M1710. 100 p.—*Bristol Co., Waterbury 20, Conn.* (253G).

Precision Calipers

Calipers for use in testing milk products for fat and total solids. Circular 630. 4 p.—*Windsor Co., 999 N. Main St., Glen Ellyn, Ill.* (253H).

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Model for analyzing complex protein solutions such as milk, colloid solutions, etc. Bulletin 25C. 8 p.—*Perkin-Elmer Corp., Norwalk, Conn.* (253I).

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Laboratory Ovens

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Features of flow transmitter and receiver in description and schematic and "actual appearance" illustrations. Bulletin 54-1074-222. 10 p. Also Bulletin 54-766-38. 8 p.—*Hays Corp., Michigan City, Ind.* (253O).

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Illustrated description of electronic regulator for speed, voltage, and current regulation of electric motor drives. Bulletin K-2076.—*Reliance Electric & Engineering Co., 1076 Ivanhoe Rd., Cleveland 10.* (253P).

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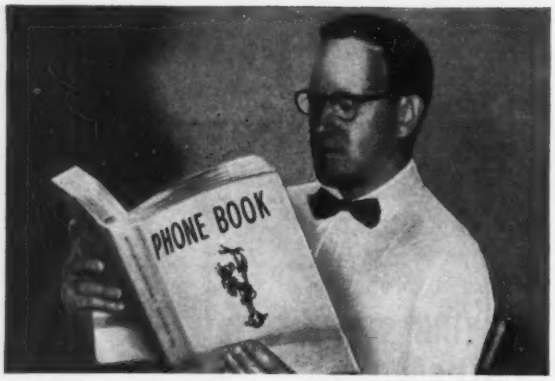

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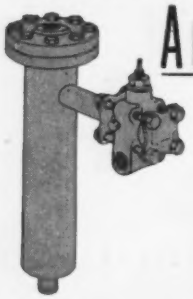

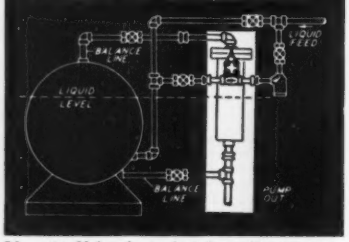

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Uses of Fiberglas low pressure pipe insulation for cold or hot water and steam lines. 4 p. data booklet. — Owens-Corning Fiberglas Corp., Toledo 1, Ohio. (254B).

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Application instructions on metal jacketing for weatherproofing of insulated lines, with detailed drawings. Folder J-25. 4 p.—Childers Mfg. Co., P. O. Box 7447, Houston 8, Tex. (254C).

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Features of concentrated equipment cleaner and mild acidic germicide for use in dairies. Form 2189.—Food & Beverage Dept., Wyandotte Chemicals Corp., Wyandotte, Mich. (254E).

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Features and field applications of protective resin coatings and linings. 8 p. brochure.—Lithcote Corp., 333 W. 40th Place, Chicago 9. (254I).

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Physical characteristics and uses of light-weight plastic tarpaulins. 6 p. folder.—Visking Corp., Plastics Div., P. O. Box 1410 Terre Haute, Ind. (254J).

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Plastic film bags for packaging turkeys. 4 p. bulletin.—Visking Corp., Plastics Div., P. O. Box 1410, Terre Haute, Ind. (254M).

Sorbitol Uses

Statement of basic considerations in uses of sorbitol in foods. Form CD82-6-54. 6 p.—Atlas Powder Co., Chem. Dept., Wilmington 99, Del. (254N).

Food Antioxidant

Information on "dpc" antioxidant, chemical reactions, and uses. Bulletins C-4-115 & C-4-197. 16 & 14 p.—Koppers Co., Inc., Chem. Div., Koppers Bldg., Pittsburgh 19. (254O).

Corrosion-Proof Linings

Information on line of corrosion-proof linings, bricks, bonding cements, protective coatings and mastic floors. Catalog G-201.—Ceilcote Co., 4883 Ridge Rd., Cleveland. (254P).

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Data on protective maintenance coatings with corrosion field test of 60 paints and paint primers. Bulletins 200 & 121. 4 p. each.—Carboline Co., 331 Thornton Ave., St. Louis 19. (254S).

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Detailed description of reproducing punch which can handle 6-12,000 punched cards per hour. Folder TM-817. 6 p.—*Remington Rand Inc., 315 Fourth Ave., New York City 10. (255A).*

Pump Fundamentals

Information on principles of operation, definition of terms and solutions to typical problems relating to centrifugal pumps. Form 7287. 12 p.—*Ingersoll-Rand Co., Cameron Pump Dept., 11 Broadway, New York City 4. (255B).*

Steel Information

How to make the most of stainless steels in the chemical process industries. 44 p. booklet.—*Crucible Steel Co. of Amer., Oliver Bldg., Pittsburgh. (255C).*

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Line of nylon bearings and advantages where bearings must operate without oil lubrication. 8 p. catalog.—*Thomson Industries, Inc., Manhasset, N. Y. (255D).*

Productive Maintenance

Details on how to organize to meet demands of automation in electrical maintenance program. Bulletin GEA-6087. 18 p.—*General Electric Co., Schenectady 5, N. Y. (255E).*

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Two booklets on functions of glycerine in food products, properties, standards and specifications. 12 p. & 16 p.—*Glycerine Producers Assn., 295 Madison Ave., New York City 17. (255F).*

Beef Casings Study

Histology of beef casing, showing what happens during processing. Bulletin 17. 30 p.—*American Meat Institute Foundation, 939 E. 57th St., Chicago 37. (255G).*

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Story of tin and ways to use, with illustrations. 20 p. booklet.—*Malayan Tin Bureau, Dept. L, 1028 Connecticut Ave., Washington 6. 255H).*

Oils & Chemicals

Product listings, descriptive information, and latest prices of oils, oleoresins, aromatic chemicals and certified colors. June catalog. 36 p.—*Dodge & Olcott, Inc., 180 Varick St., New York City 14. (255I).*

Truck Refrigeration

Six ways to refrigerate a truck. Bulletin KT-453. 6 p.—*Tranter Mfg., Inc., Lansing, Mich. (255J).*

Maintenance Guide

Description and illustration of products and wide range of maintenance problems and suggested solutions. Bulletin U344G-15M. 24 p.—*Tremco Mfg. Co., 8701 Kinsman Rd., Cleveland 4. (255K).*

Water Purification

Advantages of method of water purification with illustration of typical installation. 4 p. bulletin.—*General Ozone Corp., 855 W. Washington Blvd., Chicago 80. (255L).*

Wrapping Operations

Photos, data, and information on recent developments in wrapping and bundling operations. Bulletin 25. 8 p.—*Paisley Products Inc., 630 W. 51st St., New York City 19. (255M).*

Maintenance Sanitation

Guide to proper plant maintenance cleaning. 12 p. booklet.—*Oakite Products, Inc., 19 Rector St., New York City 6. (255N).*

Packaging Movie

11-minute sound film on operation of stapling machines.—*International Staple & Machine Co., Herrin, Ill. (255O).*

Engineering Services

Description of consultation services available for chemists and for engineers. 12 p. booklet.—*Foster D. Snell Inc., 29 W. 15th St., New York City 11. (255P).*

Laboratory Equipment

Recently added items to list of equipment for laboratory use. Catalog 21. 16 p.—*Scientific Glass Apparatus Co., Inc., Bloomfield, N. J. (255Q).*

Vermiculite Plastering

Standard specifications for vermiculite plastering and vermiculite acoustical plastic, 1954. File 21-A-5. 12 p.—*Vermiculite Institute, 208 S. La Salle St., Chicago 4. (255R).*

Plastic Film

Physical and chemical properties of polyethylene film. 20 p. booklet.—*Visking Corp., Plastics Div., Terre Haute, Ind. (255S).*

Heat Transfer Equipment

Technical data on plate-type heat transfer units. Bulletin 514-B. 32 p.—*Tranter Mfg., Inc., Lansing 4, Mich. (255T).*

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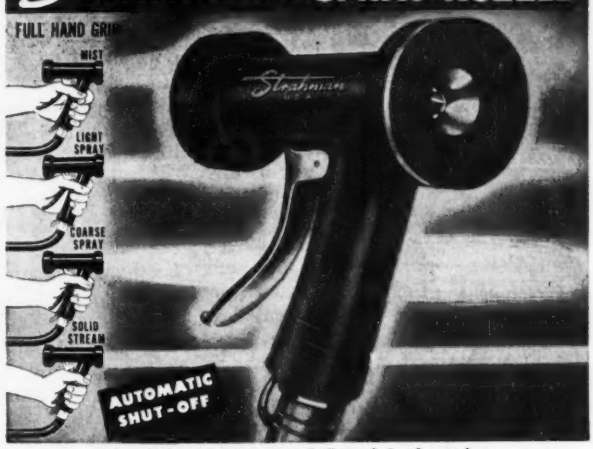

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Automatic Signals

—*Continued from page 50*

To assure bacteria-free water for every operation in the ginger ale making and bottling process, it is finally passed through sterilizing units equipped with the ray lamps.

Two filling operations not usually associated with a soft drink bottling plant are performed in the Vernor facility. The products are jugs of flavored syrup for fountain use and 10-gal. tanks of ginger ale that is carbonated and ready to be dispensed as a beverage.

First of these latter operations is performed in an air-conditioned room adjacent to the syrup storage room. Equipment comprises: One Niagara 8-wide, 1-gal. jug washer with automatic feed table and automatic discharge; one Horix automatic rotary filler; and one Alcoa pilfer-proof aluminum sealing machine.

Jugs are placed on infeed table of washing machine, washed and labels removed. Then they are discharged to conveyor line that moves them to the filler. Filled jugs are conveyed to the aluminum sealer, then to accumulating table where they are cased.

In the tank filling operation, the 10-gal. tanks first are cleaned and sterilized, then placed under a filling device that automatically meters in 1⅔-gal. of ginger ale syrup and 8⅓ gal. of treated water. A head with a block tin tube is screwed into the tank, then it is placed on a rocker, a CO_2 hose attached, and a valve opened permitting the gas to enter under pressure of 165 psi. Tank is rocked for 15 min. to carbonate the ale.

For the middle section of the syrup cooler, and for refrigeration compressors, tower water is used. This is cooled by recirculating in the tower on the plant roof.

Refrigeration for water coolers at filling lines is supplied by 4 Worthington Freon compressors, one at each line. And three 20-hp. units supply refrigerant to jackets of cooling tanks in syrup storage room. Additional refrigeration—for the chilled water used in final section of plate syrup cooler, ale coolers, etc.—is supplied by a Carrier unit.

Carbon dioxide is delivered by tank truck and stored as a liquid in two 12-ton tanks that feed directly to the carbonators and other use points in the plant.

Steam is purchased, thus eliminating need for boilers.

The building was designed by Harley, Ellington & Day, Inc., Detroit. In its construction, tile floors and walls in all processing areas, together with glass partitions between areas, point up the sanitary aspects of the plant. In addition, much thought was given by Vernor's to sanitation within the process.

In planning syrup-handling operations, for example, careful consideration was given to thorough and easy cleaning. Provision was made for circulation of cleaning and sanitizing solutions through syrup lines leading to all use points.

To accomplish this, "wash" lines were installed going from the jug, tank, and bottle fillers, as well as from the syrup storage room, to the No. 4 cooker in the syrup preparation room. By connecting feed and wash lines (with short pieces of plastic tubing) at each filler, and by-passing coolers, syrup storage tanks, and filters, solutions are circulated through the entire syrup piping system. This insures absolute cleaning with a minimum of labor.

Complete laboratory facilities are provided for quality control of finished products. Ginger ale and each of the raw materials is tested to maintain exact standards and specifications.

Daily sampling and testing provides records on important sanitary check points. These technical services are made available to all company branches and franchise bottlers.

End (*Resume reading on page 51*)

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FOOD TECHNOLOGIST Progressive vegetable packaging firm has exceptional opportunity for energetic Food Technologist. Requires formulation and maintenance of Quality Control, ingenuity to develop ideas through research. Eastern location. Please state education and experience fully. P-3757, Food Engineering.

GROCERY CHAIN wants experienced Food Technologist to head up established Products Control Department offering technical service to Buying, Merchandising, and Production Departments. The man sought is approximately 30 years old and presently holding a responsible position. College degree and several years experience in bakery, flour mill, canning, dairy, or other branch of food handling required. He should have a firm foundation of laboratory experience and a broad inquiring approach to those phases of the operation which may open up to him. Northeastern location. Send full resume, salary requirement, and photograph (if available) with first letter. Replies confidential. P-3772, Food Engineering.

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SALESMAN WANTED: Calling on meat packers. To take on profitable sideline. SW-3695, Food Engineering.

POLAK & SCHWARZ, Incorporated, New York flavor and essential oil house, seeks salesman for Ohio-Michigan area with some experience in line. Write Dept. 10, 667 Washington St., New York 14.

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(Continued on opposite page)

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(Continued from opposite page)

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3484	Sterling Root Vegetable Peelers with Carborundum Bowls
3625	Munson Mill Mach. Co. Rotary Cutter; Size "0"
3628/D1	Cincinnati Meat Grinder; 4½" screw with 10 H.P. motor
3764	Charlotte Colloid Mill No. 50 in Monel Jacketed
3272/L1	Premier Colloid Mill; 15" rotor; with 10 H.P. motor
3876/P1	Eppenbach Stainless Steel Homo Mixer; 1 HP; 7000 RPM
3262/B	Langsenkamp S/S Pulper Model B EZ Adjuster; arr. for B.D.
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2986/K6	Savage 200 lb. Marshmallow Beater; 24" x 30" x 44"
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1684/M8	U.S.Rotary Bottle and Jar Washer 60 S/S spouts
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3484A/19	Mojonnier Rotary Vacuum Filler; 14 Stainless Steel Stems
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3653/M1	Berlin Chapman 7 Spout S/S. Juice Filler up to No. 10
3640/S1	Food Mach. Co. Hand Pack Filler with 2 S/S plates for 2 sizes
3674/D1	Food Mach. Co. 10 Cylinder M & S. Bronze Filler for Pints
2184	Filler Mach. Co. Piston Fillers; up to 11 Pistons; S.S. and Monel
3673/L34	Triangle A4 Four Station Aut. Filler with in and out conveyor
3845	Food Machinery Corp. Vert. Retorts; 42" x 72"
3259	Horizontal Retort 60' x 14' with steam coil and tracks
3506	Horizontal Steam Jacketed Agitated Cooker; 4' x 7'1'
3899/L2	American Sterilizer; quick opening door; 42" x 60"
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Kettles	New or Rebuilt Kettles in all sizes; Stainless, Nickel, Aluminum, Copper, Steel, Iron, Glass Lined; some with agitators
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3113/E2	Copper coil-heated 2000 Gal. Vacuum Pan or Cooker
3870/M2	Mojonnier STAINLESS Vacuum Pan; 3' x 10' with Calandria Section S/S
3168/D1	Kane Gas Fired 10 HP Boiler; automatic operation; complete
McAllen	Vogt 317 H.P. Steam Generator or Boiler; complete with controls
Labelers	Wrap around Machines by Standard-Knapp, Burt, Kyler etc. New Jersey, Ermold, World semi-automatic Spot Labelers
3673/L19	World Straight-away Fully Automatic Labeler Model D218
2442/N2	Amsco Bag Heat Sealing Machine motorized
3387	Resina Double Head Automatic Screw Capper; 120 per min.
2626/S	Continental Can Opener No. 49 . . . motorized with 2 HP
1422/E	Max Ams Can Seamers up to No. 400 can size
1135/B 9	Hansen Semi-Automatic Can Washer for 212 x 400
3484/A1	Standard Knapp Case Printer Model No. 21
2934/W1	Standard Knapp Model E Case Packer; 24 No. 2 Cans
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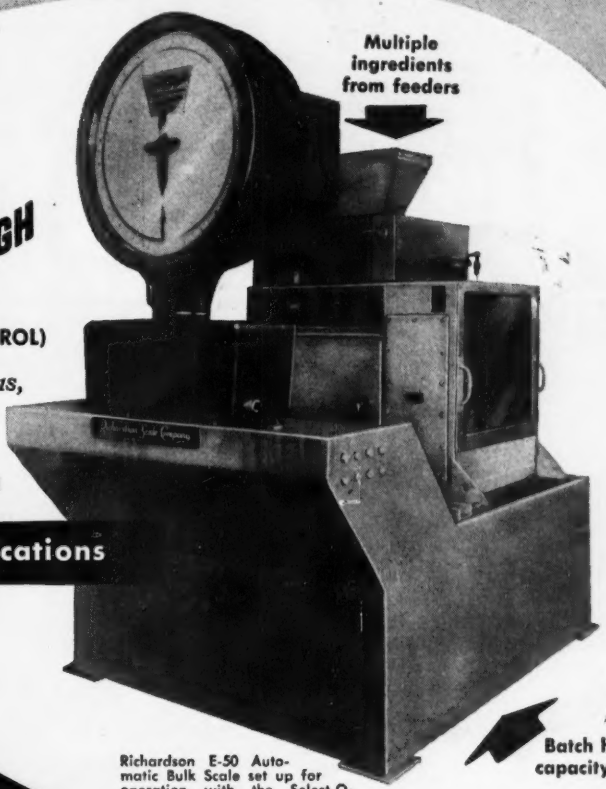

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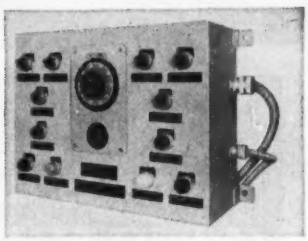

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Richardson

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8300

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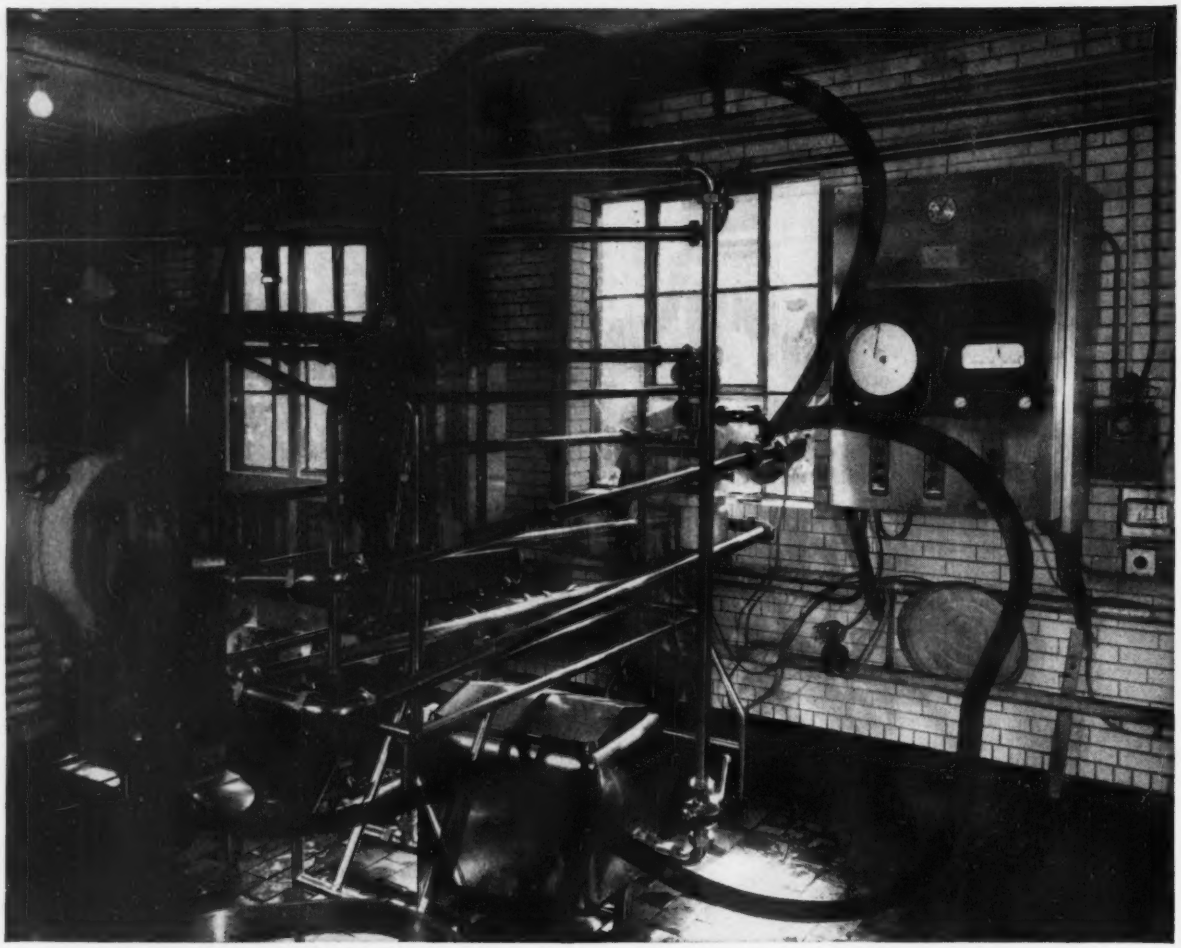

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S354

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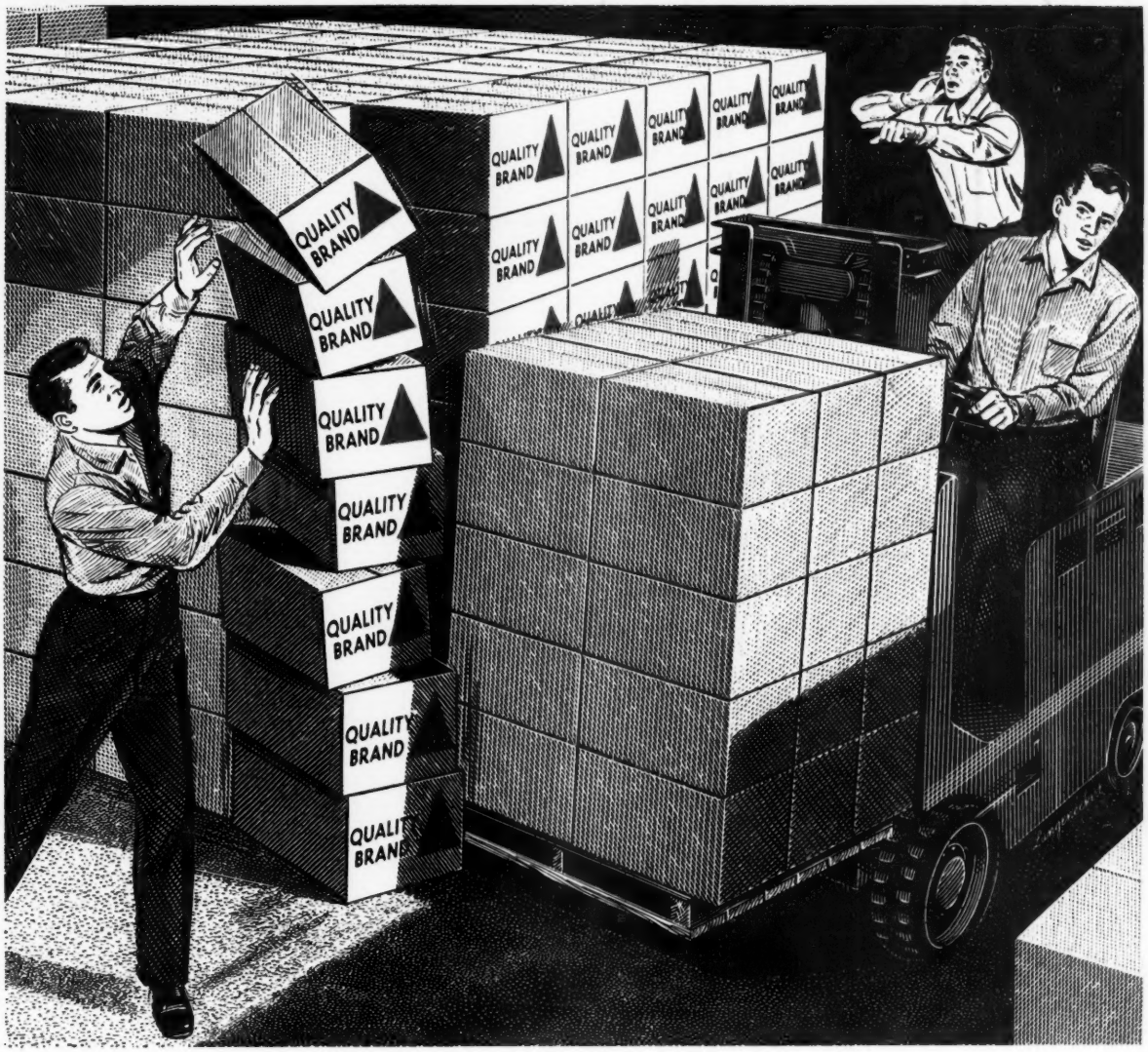

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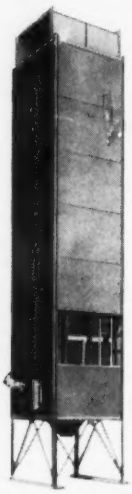

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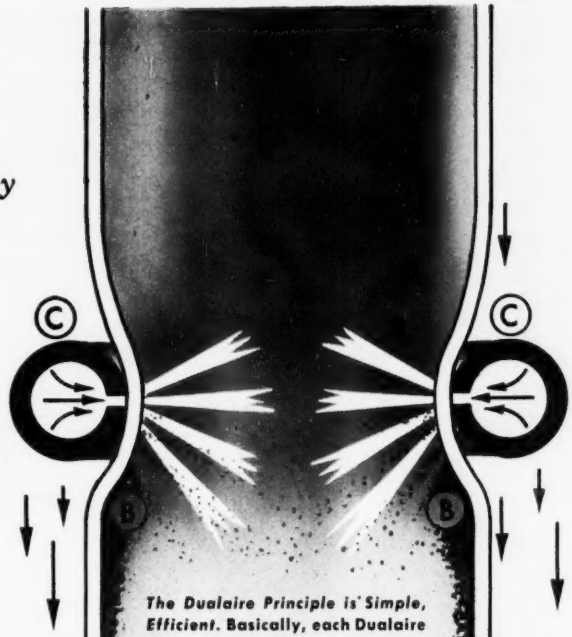
Cloth filter systems of one design or another have long been used by industry for cleaning industrial gases and/or recovering dust or other suspensions. But three problems are common to such systems... (1) Extreme changes in pressure drop and filtering efficiency as dust cakes accumulate on the filter surface... (2) Wide pressure fluctuations and surges in the plant system as filter units become clogged or are cut out and rapped for cleaning... and (3) Rapid deterioration of the filter material by the vibration, shaking and rapping equipment used for cleaning.

But now the DUALAIRE Collector—as engineered by Western Precipitation, pioneers in the field of dust recovery—provides the answer to these and other problems common to conventional bag-house equipment.



The Dualaire Principle is Simple, Efficient. **Basically, each Dualaire filter unit consists of a cloth or felt tube, open at both the top and bottom. (A) Dust-laden gases enter at top of the tube and are filtered as they pass through the side walls of the tube to the exhaust system. (B) Dust particles collect on the inside of the tube and *before* the cake builds up sufficiently to affect filter operation, a tubular blow ring (C) automatically starts moving up and down the outside of the filter cylinder. A jet of air, concentrated by this blow ring, reverses the normal gas flow at the point contacted by the ring, thus jetting the dust layer off of the inner surface of the filter tube.**

This jetting action is further assisted by a flexing of the filter cylinder as the blow ring passes, thus cracking and loosening the dust layer from the inner surface, from where it drops to the recovery chamber below the bottom of the tube.

The entire operation is positive and simple. The blow ring starts its action *automatically* as soon as the dust layer causes a pre-determined pressure differential. And after the filter surface is cleaned, the blow ring *automatically* stops.

6 ADVANTAGES OF DUALAIRE DESIGN...

PRESSURE DROP remains uniformly low at all times because the dust is removed continuously in *small portions.*

FILTERING EFFICIENCY remains uniformly high at all times without the "choking" action characteristic of conventional bag-houses. Actual field tests show efficiencies as high as 99.99%!

DUST RECOVERY is in steady increments — not in sudden large "batches" as with conventional rapping systems. Thus the Dualaire eliminates surges and detrimental variations in the plant system.

FILTER ELEMENT has a much longer life because it is not subjected to the stresses of rapping or jarring while being cleaned. Dualaire reverse-jet cleaning action is gentle, yet far more effective.

GREAT SAVINGS are also made in space and the size of installation required. Because each Dualaire filter unit is cleaned more-or-less constantly without shut-down, there is no need for costly standby units — or the complicated switching equipment to cut standby equipment in and out.

BASIC UNITS are "sectionalized" and are available in 5 standard heights. Sections can be bolted together in any desired multiple, providing a capacity range to fit virtually any requirement. As needs increase, add more sections.

There are many other advantages built into the DUALAIRE. *For further details send for this descriptive 12 page booklet. Or contact your nearest Western Precipitation representative!*

WESTERN
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DESIGNERS AND MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

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